RESEARCH KEEPS **B.F.Goodrich** FIRST IN RUBBER

Now you can see the difference between grommet belts and ordinary V belts

B. F. Goodrich grommet V belts last longer, serve better, save money

THE "X-ray" belt, made of transparent material, was developed just to show you the exclusive B. F. Goodrich grommet construction. Now you can look beneath the surface of a V belt, see for yourself what makes B. F. Goodrich grommet V belts last longer, keep running with fewer interruptions, need less attention.

Note the twin grommets — Each of these grommets is like a giant cable except that it's *endless* — a cord loop built up by winding heavy cord on itself. It has no overlapping ends. Because most of the failures in ordinary V belts occur in the region where cords overlap, the endless cord section in a grommet V belt eliminates such failures.

Concentrated cord strength — All of the cord material in a B. F. Goodrich grommet multiple-V belt is *concentrated* in twin grommets, positioned close to the driving faces of the pulley. No layers of cords to rub against one another and generate heat; cord and adhesion failures are reduced.

Better grip, less slip — Grommet belts have more rubber in relation to belt size. Without any stiff overlap, they're more flexible, grip pulleys better. Size for size, grommet belts give ⅓ more gripping power, pull heavier loads with a higher safety factor. Because there is less slip, there is also less surface wear.

Only B. F. Goodrich has the grommet!—No other multiple-V belt is a grommet V belt (U. S. Patent No. 2,233,294). Now available in C, D and E sections. Your local BFG distributor has an "X-ray" demonstrator belt and will be glad to show it to you. *The B. F. Goodrich Company, Industrial & General Products Division, Akron, Ohio.*

Grommet V Belts BY

B.F.Goodrich

RUBBER FOR INDUSTRY

LIKE AN
ATOM-IC
EXPLOSION
Just 1/32" (pinhole size) faucet leak
MUSHROOMS into ATOMIC WASTE
of approximately 95,000 gallons
of water yearly—costing:
$24.14
@ $1.90 per 50 cubic feet

If a hot water faucet, then (actual) FUEL WASTED heating 95,000 gallons costs approximately:
$88.91 if coal (9870 lbs.)
$91.08 if oil (792 gals.)
$84.41 if gas (84,411 cu. ft.)
Above figures authenticated by Hackensack Water Co. and American Gas Association.

STOP this needless WASTE during today's MATERIAL and MANPOWER shortages with "SEXAUER" "Easy-Tites" that outwear ordinary faucet washers 6-to-1, thus SAVING labor on 5 REPEAT repairs, PLUS water and fuel, while prolonging the life of SCARCE fixtures.

PAT'D.
"EASY-TITE"
FAUCET WASHERS
...a modern laboratory triumph, are compounded from du PONT NEOPRENE (tested up to 300°F.) instead of rubber—to withstand DESTRUCTIVE HEAT common in present-day superheating water systems—that formerly broke down washer's structure.

Built like a tire with fabric re-inforcement they resist the grinding, closing squeeze that SPLIT and MUSH ordinary washers out of shape...causing LEAKS.

Through combining NEOPRENE and FABRIC RE-INFORCEMENT they OUTWEAR ordinary washers 6-to-1 on hot or cold FAUCETS—thus you slash water, fuel and labor costs.

THE NEW 'SEXAUER' CATALOG
Edition G, just out, pictures over 2500 TRIPLE-WEAR plumbing REPAIR parts and Pat'd. Precision Tools. It's today's accepted buying guide for discriminating purchasing and maintenance personnel among thousands of top PLANTS, INSTITUTIONS and GOVT. AGENCIES that rely on SEXAUER repair materials. Send for your copy today!

Then too, there's a SEXAUER TECHNICIAN within quick call from coast-to-coast, who offers a special SURVEY service that sets up a schedule of the exact replacement parts required for your particular plumbing fixture regardless of make or age and without obligation.

A postcard will bring him and your NEW Catalog promptly.

J. A. SEXAUER MFG. CO., INC., Dept. 852
2503-05 Third Avenue, New York 51.
as advertised in THE SATURDAY EVENING POST
SEXAUER
WORLD'S LEADING SPECIALISTS IN PLUMBING AND HEATING REPAIR PARTS

'ROUND ABOUT with the editors in field and office

Edited by R. L. Marinello

Take Inventory of Employees

A SPECIAL questionnaire designed to help companies find out what their employees honestly think about their jobs is being made available to business and industry for general use. It is simple to administer, inexpensive, and reliable.

This new checklist, Employee Inventory, lets employees tell how they feel about working conditions, their job, their pay, management, job security, benefits, supervision, advancement of other employees—and indicates the effectiveness of company communication and employee relations activities.

Employees' answers are completely anonymous, but the questionnaire allows management to measure morale for their company as a whole; to compare morale between different departments or plants; and to compare morale in their company with the average for others, particularly in their own industry.

Additional information regarding this questionnaire may be obtained from Ira S. Glick, Information Director, Science Research Associates, 57 W. Grand Ave., Chicago 10, Illinois.

Winners to Be Announced

THE WINNERS of the Merit Award Competition, sponsored by the 4th International Lighting Exposition, will be announced at the Lighting Exposition and Conference to be held in Cleveland, May 6 to 9, at the Cleveland Municipal Auditorium.

Six important lighting trends indicated by the entries will be of interest to all those concerned with mobilizing lighting knowledge and putting it to use to promote America's welfare. These six trends are:

1. New lighting techniques: Use of plastics and glass and combinations of light source, such as incandescent, fluorescent and mercury vapor.

2. Lighting system designs are better: They tie in architecturally. There are more geometric patterns from typical equipment shown. In many installations six and seven manufacturers are represented, showing that special equipment was chosen to solve particular problems.

3. Better maintenance features shown: Provisions have been made for better, easier and quicker maintenance.

4. Greater use of high voltages: This is particularly illustrated in fluorescent and mercury vapor fixtures.

5. Trend toward the use of 8 ft slimlines.

6. Entries are definitely of a better quality of lighting and will provide better visual environment.

All winning entries will be on display at the Court of Honor in the Exposition Hall of the Cleveland Auditorium during the entire four days of the Exposition. Winners will receive their awards at a special conference session on May 7th.

New Plants Going Up

C. H. Wheeler Mfg. Co. broke ground for an addition to their plant in Philadelphia . . . **Allis-Chalmers Mfg. Co.** plans an expansion of its Springfield, Ill. plant . . . **E. I. du Pont de Nemours and Co.,** has announced plans for construction of the Haskell Laboratory of Industrial Toxicology near Newark, Del. . . . **The Timken-Detroit Axle Co.** has started production of axles and transfer cases at its new Ohio Axle & Gear Div., Newark, Ohio . . . **Marlin-Rockwell Corp.** has started construction on a new plant near Jamestown, N. Y. . . . **E. F. Hauserman Co.** has completed a new plant across the street from the company's main plant at 6800 Grant Ave., Cuyahoga Heights, Cleveland, Ohio . . . **The American Agile Corp.** announces completion of a new building at 5461 Dunham Road, Maple Heights, Ohio . . . **The Cleveland Industrial Tool Corp.** announces completion of its building and equipment expansion program for the production of high precision aircraft parts . . . **Corning Glass Works** is planning a new Optical glass plant in Harrodsburg, Kentucky . . . **C. A. Norgren Co.** has completed its new plant at Englewood, Denver, Colo.

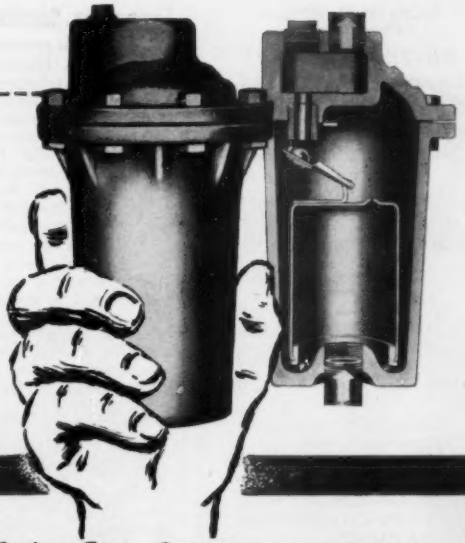
Engineering Scholarships Offered

STARTING WITH the school year September, 1952, two Lamson scholarships in Mechanical or Administrative Engineering will be established—one at Stevens Institute of Technology, Hoboken, N. J., and one

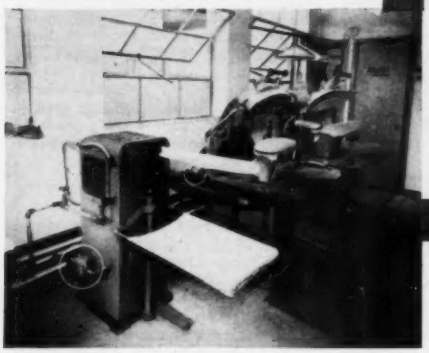
(Continued on next page)

Plant Engineering is published monthly at Chicago, Ill. Subscriptions one year $10 in the U. S. A. Canada $11; Elsewhere $12. Acceptance under Section 34.64, P. L. & R. authorized by Post Office.

THIS will plug the holes in your boiler!



33 1/3% REDUCTION IN ANNUAL COAL BILL after installing Armstrong traps on cooking vats — a Midwestern lumber company.



$59.62 FUEL SAVINGS PER MONTH after unit trapping a Milwaukee dry-cleaning plant with only 14 small sized Armstrong traps.

What Holes? Steam trap holes!

The orifice in a steam trap is just the same as a hole in your boiler if it leaks steam. A ¼" hole (orifice diameter of a medium sized 100 psig trap) will leak over $100 worth of steam a month. Now, if you had 100 traps... but you don't need to figure the possible steam loss if you have Armstrong traps. Here are a few reasons why:

1. Valve and seat of chrome steel heat-treated, ground and lapped. Will not wire draw or pound out.
2. All other working parts of 18-8 stainless steel for long wear and corrosion resistance.
3. Buckets have generous buoyancy margin of safety to prevent prime loss.
4. Dirt can't settle on valve or seat to hold orifice open.
5. Nothing to stick or bind to prevent valve from closing
6. Backed by 40 years of experience in building inverted bucket traps.

Get the full story from your Armstrong distributor or write for a copy of the ARMSTRONG STEAM TRAP BOOK — complete data on operation, selection, installation and maintenance of traps. Free on request.

ARMSTRONG MACHINE WORKS
912 MAPLE STREET, THREE RIVERS, MICH.

ARMSTRONG STEAM TRAPS

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Engineering Scholarships Offered

(From preceding page)

at Syracuse University, Syracuse, N. Y. These scholarships are offered primarily to encourage talented children, grandchildren and other relatives of Lamson employees to study in the field of mechanical engineering and material handling. The scholarships will be for four years on a year-to-year renewal basis, contingent upon performance.

All candidates must meet the entrance requirements of either of the institutions they may choose. Final awards will be made by the scholarship committees of the institutions, who will consider previous scholastic records; general scholastic aptitude; character; qualities of leadership and potentialities for success in engineering work.

Potential candidates, who will have graduated from an accredited high school or its equivalent by June 1952, should write to: Lamson Scholarships, Lamson Corporation, Syracuse 1, N. Y., for further information.

Plant Engineer Clubs Elect New Officers

Chicago: At the April 4 meeting of the Plant Engineers Society of Chicago the election of officers for the coming year was held. **Don Brown,** Corn Products Refining Co., was elected president; **C. E. Burns,** A. B. Dick Co., was elected vice-president; **Ted Ramond,** Goodman Mfg. Co., was elected secretary-treasurer; **Herman Zoeter,** Continental Can Co., holds office of senior board member for one more year; and **D. F. Redman,** International Harvester Co., was elected junior board member.

The club is planning a visit to International Harvester Co., Farm Tractor Division, West Pullman Works, 1015 W. 120th St., on May 2nd. At the June 6th meeting, a talk will be given by A. B. Pattou of Glidden Co. on paints and plant maintenance.

Dayton: The following members were elected to take over the club duties for the next year: **Charles W. Wright,** Delco Products Div. of G.M.C., was elected president; **George E. Miller,** Frigidaire Div. of G.M.C., was elected vice-president; and **F. W. Hardin,** Hewitt Soap Co., was elected secretary-treasurer.

Movie Tells How to Stop Waste

A color and sound film on conservation of materials, "Let's Stop Waste," has been produced by Boeing Airplane Co.

Intended primarily for the aviation industry, but applicable to the general production waste problem, it covers such items as liquids, small tools, cleco pins, masking tape, paints, brushes and paper towels.

'ROUND ABOUT

On 16 mm film, this 7½ minute movie is offered to industry at a cost of $85. Inquiries should be made to William Hagen, Factory Manager's Office, Boeing Airplane Co., Seattle 14, Washington.

Plant Maintenance Team Reports

PLANT ENGINEERING recently received a letter from the team secretary of the Plant Maintenance Team which toured various plants in the United States the first part of this year.

"The Plant Maintenance Team has now arrived back safely in England, and I have returned to my office to start work once again.

"Our tour of the States was a most interesting one, and we were able to get a very clear picture of the present status of plant engineering in your country. In our report we hope to be able to embody the better idea of plant maintenance from both countries, and I hope that this report may be of some interest to plant engineers when it is published, probably in the early autumn.

"I wish to express both my thanks and the thanks of the other members of our team for the very generous hospitality which was extended to us in Philadelphia and Chicago. We all thoroughly enjoyed meeting the plant engineers that were invited along on these occasions.

"I should also like to express my thanks for letting each member of the team have a copy of the photographs which were taken at these dinners (see March 1952 PLANT ENGINEERING, page 91), and you may be sure that we will keep them as a very happy memento of our visit to the States." *Colin Troup, John D. Troup Limited, 90 High Holborn, London, W.C. 1, England.*

Personnel Changes

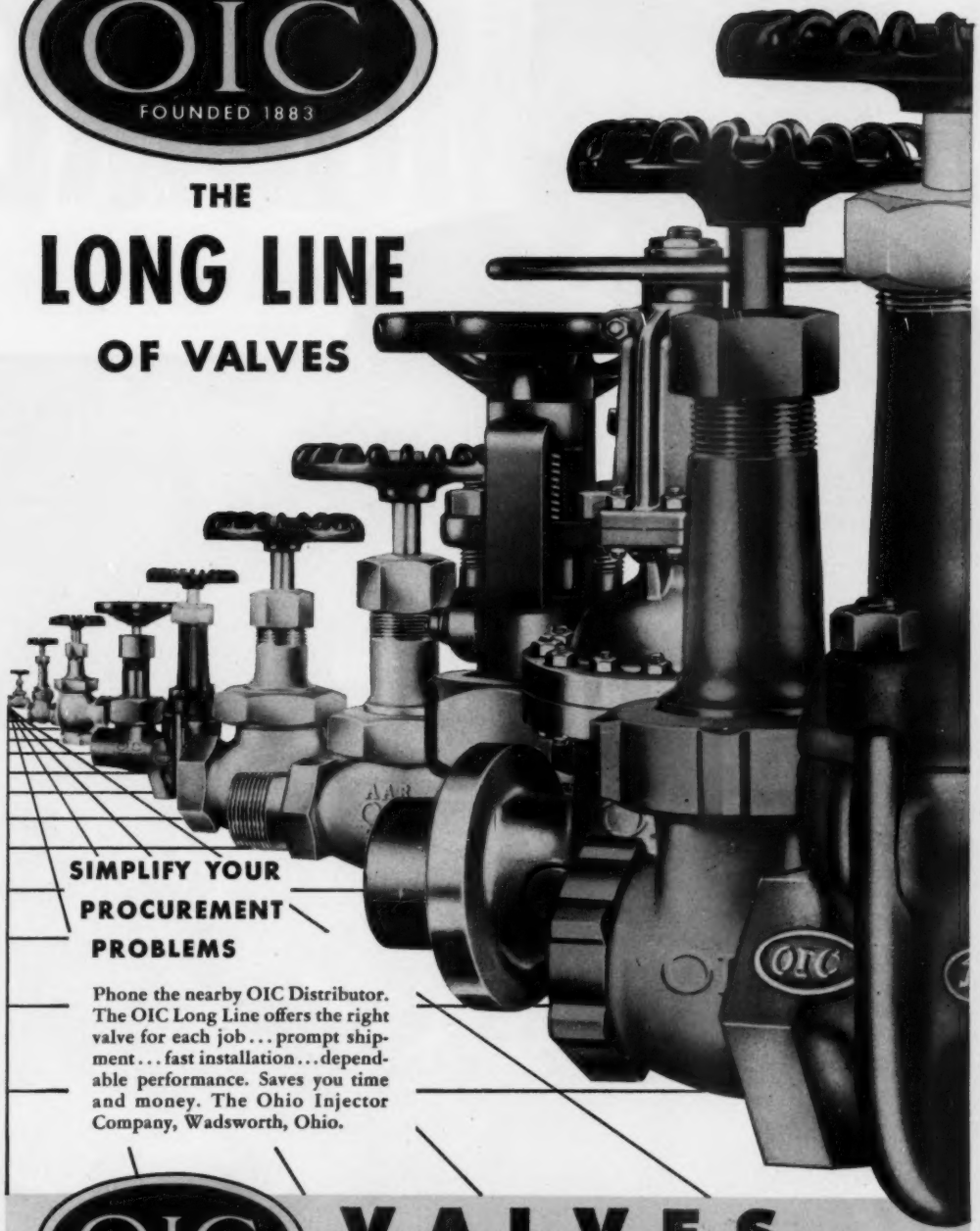
Walter Borsits has been promoted to plant superintendent of the Aircraft Parts Division of Cleveland Industrial Tool Corp.

Robert J. MacMeekin has been transferred from Hamilton, Ohio, as chief engineer of the Pump Division of C. H. Wheeler Mfg. Co. in Philadelphia. **H. O. Fullam** has been appointed chief industrial engineer in charge of methods engineering, tool engineering, tool manufacturing and maintenance of plant equipment at the Philadelphia plant. Mr. Fullam was shop superintendent of the G. A. Gray Co. of Cincinnati, Ohio, prior to joining the Wheeler organization.

H. M. Killmar has been promoted to Assistant Works Engineer of the Refractories Division of The Carborundum Co., Perth Amboy, New Jersey.

OIC
FOUNDED 1883

THE
LONG LINE
OF VALVES



SIMPLIFY YOUR
PROCUREMENT
PROBLEMS

Phone the nearby OIC Distributor. The OIC Long Line offers the right valve for each job... prompt shipment... fast installation... dependable performance. Saves you time and money. The Ohio Injector Company, Wadsworth, Ohio.

OIC
FOUNDED 1883

VALVES
FORGED AND CAST STEEL • IRON • BRONZE

DARE

TO COMPARE!

The Simplest...

Compare the fewer moving parts—the easy installation—straight-through wiring that simplify the Life-Line design . . . See the uniformity of line and interchangeability of parts . . . Watch how quickly parts are front-removable. So simple. You can do it blindfolded! Which means—simplified maintenance!

The Toughest...

Compare the rugged construction of the enclosure which is Bonderized* and finished with baked grey enamel. Rust resistance that lasts a lifetime . . . See the positive protection that Life-Line offers with the patented "De-ion*" Arc Quencher that stops contact pitting and provides greater arc interrupting capacity . . . Watch how the bimetallic relay gives snap-action overload protection.

The Most Dependable Linestarter Ever Built!

Read what this chief electrician of a large southern paper mill* says: "The Life-Linestarter, through a foot-operated pushbutton, starts and stops the motor four times a minute, 24 hours a day, 30 days a month. After at least a million cycles, contacts showed little wear."

SEE FOR YOURSELF!

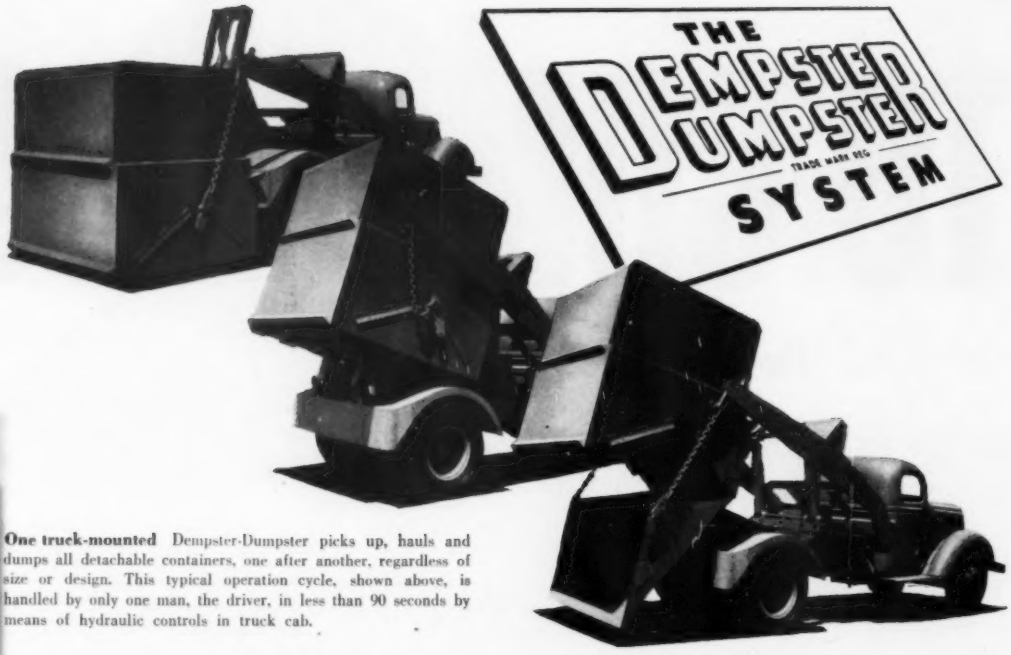
Ask to see the "Strip-Down" Test. It will open your eyes to Life-Line-starter's stepped-up performance and maintenance. Your Westinghouse salesman will show you. Or send for, "Tomorrow's Starter Today", B-4677. Write: Westinghouse Electric Corporation, Box 868, Pittsburgh 30, Pa.

*Name on request

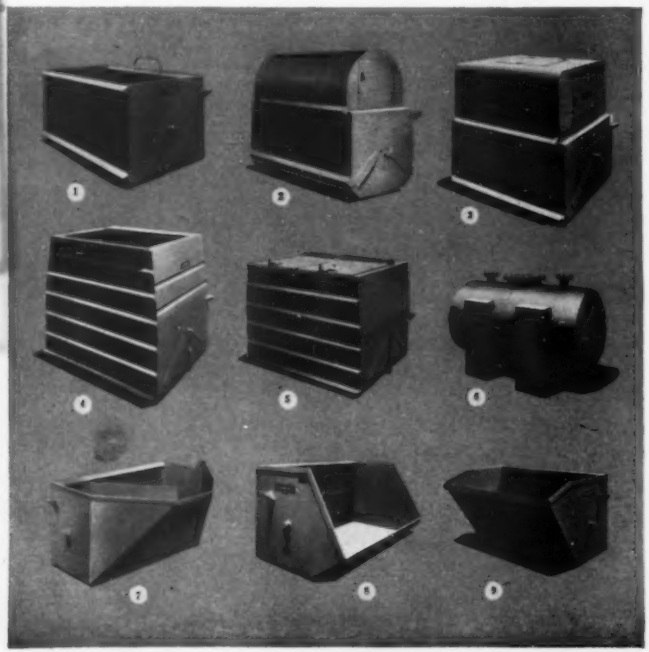
J-30096

THE DEMPSTER DUMPSTER SYSTEM

TRADE MARK REG



One truck-mounted Dempster-Dumpster picks up, hauls and dumps all detachable containers, one after another, regardless of size or design. This typical operation cycle, shown above, is handled by only one man, the driver, in less than 90 seconds by means of hydraulic controls in truck cab.



1—Cuts Cost of Equipment and Operation— It is not unusual for one Dempster-Dumpster to perform the work of from 3 to 5 conventional trucks . . . reducing investment accordingly. Eliminating trucks also means eliminating tires, gas, oil, maintenance and man hours.

3—Eliminates Re-Handling of Materials— Re-handling of materials, which by conventional methods are hand loaded by loading crews into dump trucks, is eliminated. Each detachable container remains at its convenient location until loaded. Then, in less than a minute, it is picked up by Dempster-Dumpster and taken to destination. There it is dumped or set down intact . . . saving hundreds of man hours annually.

• • •

At left are a few standard containers for general requirements—1—Drop Bottom Container built up to 10 cu. yd. capacity to handle heavy materials. 2—Apartment Type for bulk trash and rubbish with sump bottom for handling moist materials. 3—Universal Type available with top and end doors. 4—Drop Bottom Pressed Steel Type for lighter service. 5—Drop Bottom Pressed Steel Type with counterbalanced spring lids. 6—Tank Type Container meeting A.S.M.E. specifications. Capacities up to 1,200 gallons. 7—Tilt Type with Converged Lip for handling fine aggregate, wet or fluid materials. 8—Skip Type with Lip to assist in holding certain types of loaded materials in place. 9—Tilt Type for handling heavy materials. Built water-tight.

DEMPSTER BROTHERS

MOST EFFICIENT METHOD OF MATERIALS HANDLING BY TRUCK EVER DEVISED

If you collect and move bulky, light or heavy materials in your plant operation . . . be they solid, liquid, dust, rubbish or waste, the Dempster-Dumpster System merits your careful consideration and investigation. This revolutionary method of bulk materials handling by truck can save you thousands of dollars annually!

The fundamental reason why the Dempster-Dumpster System is the most efficient method of materials handling by truck is because, in this system, one truck serves scores of detachable containers. In other words, a truck-mounted Dempster-Dumpster . . . with only one man, the driver . . . picks up, hauls, dumps or sets down intact . . . one after another . . . any required number of big Dempster-Dumpster Containers.

The hydraulically operated Dempster-Dumpster is mounted on any make truck chassis of suitable size.

The steel containers are available in a wide variety of designs best suited to the type of materials handled—be they bulky, light or heavy . . . solids, liquids or dust . . . trash or rubbish. They range in size up to more than three times the capacity of the average dump truck body. The containers are spotted inside and outside your plant at convenient materials accumulation points. A few of the dozens of detachable containers are shown here so that you may see the flexibility of this system in handling all types of materials in your plant with one truck. It may be that none of these containers will fit your own particular need. But remember there are Dempster-Dumpster Containers that will, either standard or special design.

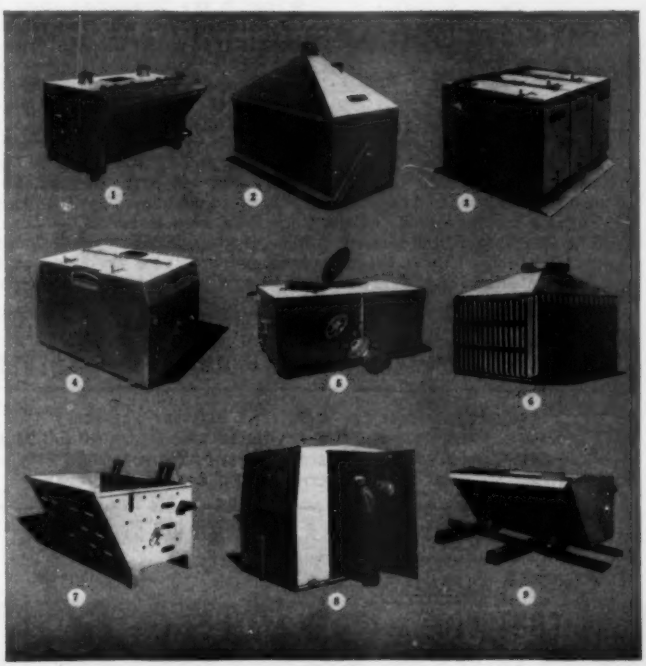
More efficient and lower cost materials handling in your plant may be simply a matter of getting the probing minds of your engineers and ours together. Our files contain hundreds of inquiring letters that ultimately resulted in savings of thousands of dollars annually in every conceivable type of manufacturing plant. A discussion with our engineers might develop the same results for you. If advisable, they will be glad to make, without obligation on your part, a proper survey to determine just what equipment you may need. The Dempster-Dumpster System is manufactured exclusively by Dempster Brothers, Inc.

2—Eliminates Standing Idle Time—One man, the truck driver, replaces truck loading crew. Detachable containers are pre-loaded through normal accumulation. Truck-mounted Dempster-Dumpster and driver never stand idle because there is always a pre-loaded detachable container to be serviced.

4—Increases Efficiency, Sanitation and Good "Housekeeping"—The Demp-Dumpster System is a complete, unified plan for area-wide materials handling. Materials to be disposed of or transferred are placed in a nearby container as they accumulate. Containers used for trash and rubbish are fire-proof, rat-proof and fly-proof. No other method of materials handling by truck can match the Dempster-Dumpster System in efficiency and low operating cost!

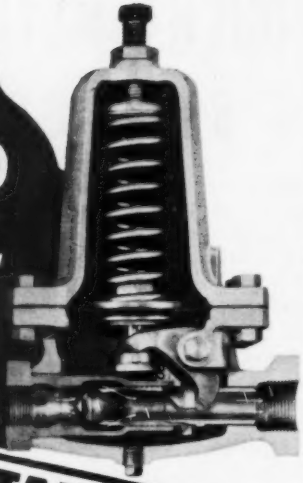
• • •

At right are a few containers built for special requirements— 1—Five cu. yd. container with swivel casters for handling waste blast sand. 2—Three cu. yd. Dust Collector Type equipped with gaskets. 3—Multi-Karry Container equipped with three 2 cu. yd. steel boxes with casters and lids. 4—Six cu. yd. drop bottom container with two spring-hinged lids and special loading opening in top. 5—Rectangular Tank Type Container with gate valve and gasketed Lid. 6—Chlorinator Ash Container designed for handling hot residue approximately 1500° F. 7—Tilt Type Container built for cast linings for handling hot materials. 8—One of several special "Tool and Equipment" Type Containers. 9—One of several types of special built containers equipped with ball bearing trucks.



152 Shea Bldg., Knoxville 17, Tenn.

PUT IT ON THE LINE AND *Forget it*



CASH STANDARD *Streamlined* PRESSURE REDUCING VALVE TYPE 1000

Streamlined
FOR SMOOTH EVEN FLOW
of Steam, Water, Air, Oil, Etc.

● That is the Streamline story in a nutshell. The way it works is the answer — from inlet to outlet the fluid flows through this valve in a straight line — a streamline. There is no detour around a dividing wall — the direction of the flow is not changed at right angles because of a seat wall AND the flow is not broken up by valve stems, springs, or other parts. Forget it once it's installed like others do. PROOF: "We have a large number of buildings scattered over about 100 acres of land. Just where we installed these Streamlined Valves I dont know. But I do know that I haven't seen or heard of them since they were installed."—Case No. 343. PROOF: "We installed four or five of your Streamlined Regulators. The last I heard of them they were holding pressure the same as when we first installed them. And as far as I know no one has ever touched them." —Case No. 345.

Bulletin 1000 will give you full details.

YOU GET MAXIMUM CAPACITY WHEN IT IS NEEDED MOST

TROUBLE-FREE SERVICE	CONSTANT DELIVERY PRESSURE
SMOOTH OPERATION	PRACTICALLY ZERO IN MAINTENANCE COST
TIGHT CLOSURE	SPEEDIER PRODUCTION RESULTS
NO SPOILAGE	COST-SAVING OPERATION

ACCURATE PRESSURE CONTROL AT ALL TIMES

CASH STANDARD CONTROLS.. VALVES

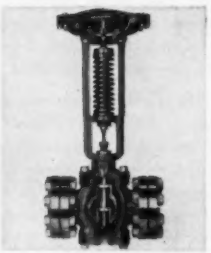
A. W. CASH COMPANY
DECATUR, ILLINOIS

●

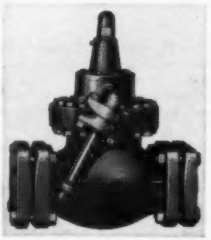
BULLETINS AVAILABLE ON OTHER CASH STANDARD VALVES

Send for them

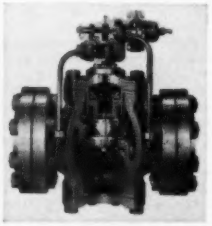
●



Bulletin 968 features the CASH STANDARD Type 34 Pressure Reducing Valve — direct operated — direct acting for handling steam, hot water, cold water, air, oil, brine—and most liquids and gases except some injurious chemicals. Illustrates and describes the different styles available and tells about their applications. Three pages of capacity charts.

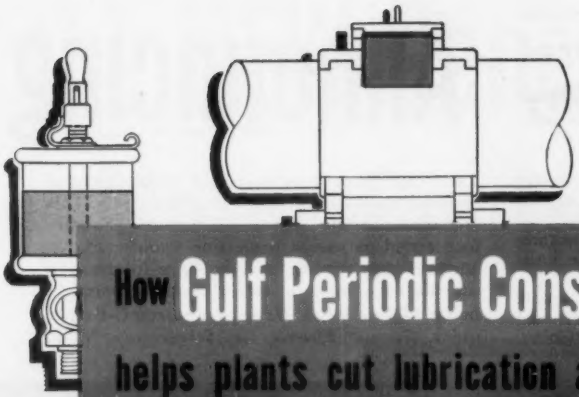


Bulletin 956—features the CASH STANDARD Type 4030 Back Pressure Valve — designed to automatically maintain a constant pressure in the evaporator corresponding to a constant temperature desired. Shows an Ammonia and Freon Gas Capacity Chart based on ABSOLUTE pressures.



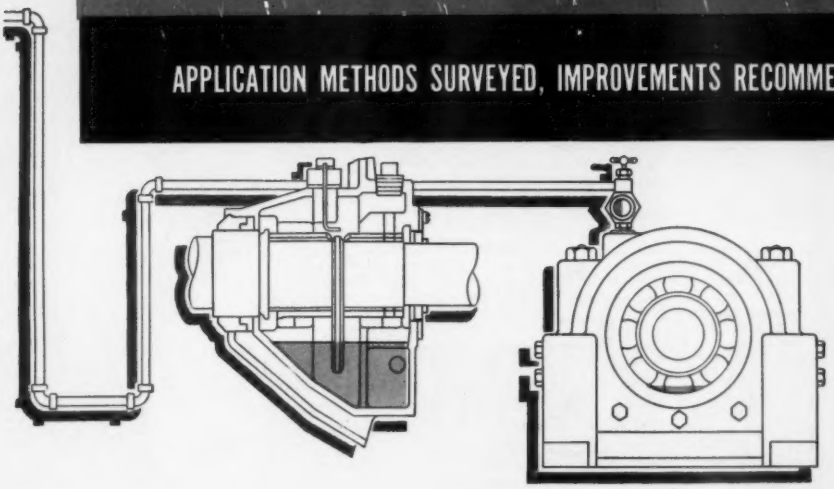
Bulletin 966—features the CASH STANDARD Self-Contained, Pilot Operated Type 10 Pressure Reducing and Regulating Valve for use with water or air; with any gas or oil that is non-corrosive; and with refrigerating fluids such as Ammonia and Freon. Many interesting particulars explained such as: how valve works, tight seating, large capacity, no waste, no water hammer or chatter.

NUMBER 1 OF A SERIES



How Gulf Periodic Consultation Service helps plants cut lubrication and maintenance costs

APPLICATION METHODS SURVEYED, IMPROVEMENTS RECOMMENDED



A logical source of information and help on any problem that involves lubricants is a trained Gulf Lubrication Engineer. You'll find he does more than simply recommend the proper oils and greases for your equipment. He offers help on every phase of lubrication, on every type of equipment.

When he initially surveys your machinery, for example, he keeps an experienced eye on the suitability of various applicators and systems which supply the oils and greases. The chances are good that some of this equipment in your plant could and should be improved.

For example, how much hand oiling is done? How is grease applied, at what intervals, and to how many individual points? You may benefit from the installation of more efficient methods of application.

The need for this type of survey increases with the age of the equipment. However, this is just one phase of Gulf's cooperative plan known as Gulf Periodic Consultation Service. For additional information, call in a Gulf Lubrication Engineer or send the coupon below.

GULF SERVES INDUSTRY

Gulf Oil Corporation · Gulf Refining Company PE
719 Gulf Building, Pittsburgh 30, Pa.

Please send me, without obligation, a copy of the booklet "Gulf Periodic Consultation Service."

Name.....
Company.....
Title.....
Address.....

For centralized control with greater flexibility

Announcing

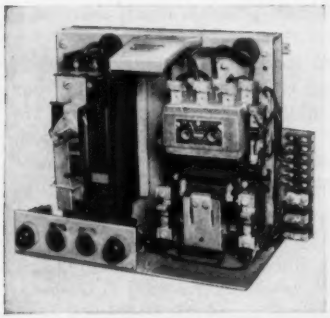
Here's an attractive, versatile new motor control center that you can easily plan, install, and service. Compact—a section is only 20 inches wide, 20 inches deep, and 90 inches high. It will accommodate NEMA Size 1 through 4 starter units back to back.

A four-inch wiring trough provides ample space for outgoing wires and cables. Starter units are designed for easy inspection and servicing.

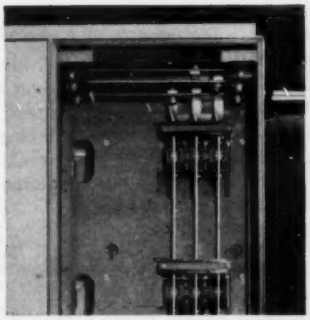
There are many provisions for protecting personnel from mechanical and electrical injury. This G-E motor control center has also been laboratory tested to assure protection against 25,000 amperes short-circuit current. More information on this new, modern motor control center in bulletin GEA-4979A. Write your nearest G-E office today. *General Electric Co., Schenectady, N. Y.*

THIS COMPACT, ATTRACTIVE, G-E MOTOR CONTROL CENTER provides the most modern method of controlling a-c motors up to 200 horsepower from a central location.

the NEW General Electric Motor Control Center

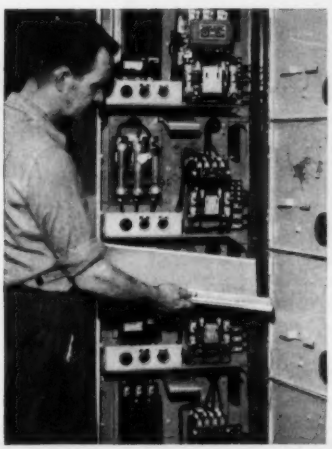


STARTER UNITS ARE COMPLETELY ACCESSIBLE. All components—even the pilot devices—are mounted on a sturdy frame with all terminals front connected.

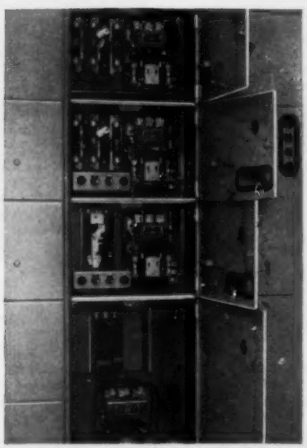


DESIGNED TO PROTECT PERSONNEL. Rear view shows metal barrier that separates starter unit space from bus bars. Vertical section features new "I-beam" construction for strength.

EASY TO INSTALL AND INSPECT. Sturdy, light-weight starter units are easy to handle, and interchangeable because of standardized dimensions and components.



EASY TO WIRE. Ample four-inch wiring trough is completely accessible by removing horizontal metal barriers between units. Barriers isolate and support units as they are slid into section.



VERSATILE. Starter unit sizes and types are in even multiples of 14 inches. Fusible and circuit breaker combinations of the same starter size are interchangeable without changing doors.

EASY TO SERVICE. Doors swing wide (no hinge wiring); unit is easily disconnected from bus and held in test position for protected servicing.

GENERAL ELECTRIC

730-31

The Canton Binfeed - Another
TO SOLVE YOUR STOKER

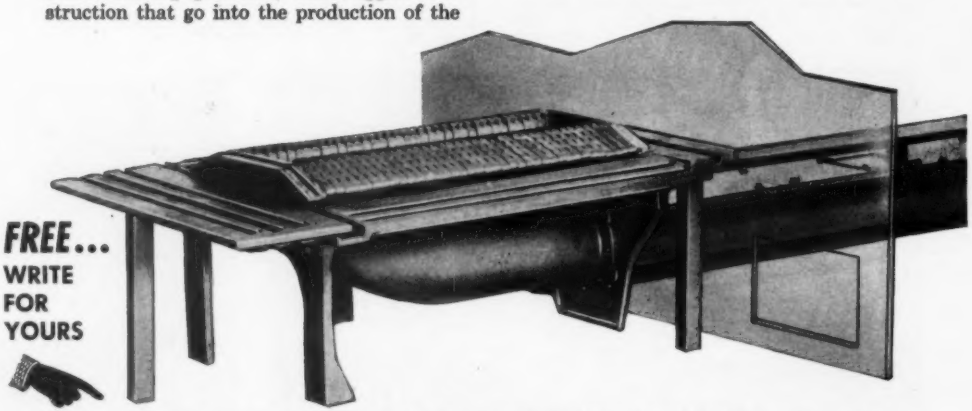
When buying stokers, make sure the equipment you buy fits your operating requirements *exactly*. The dependability of Canton Stokers, established in thousands of installations during the past 40 years, will guarantee you the finest performance in *your* operation because they are designed specifically for YOUR firing and combustion demands.

Keeping pace with the Canton policy of meeting *all* stoker requirements, the CANTON BINFEED STOKER offers several specific operating advantages — less coal handling . . . higher combustion efficiency . . . lower maintenance costs . . . and, most important, CANTON OPERATING RELIABILITY.

The top-quality materials, engineering and manufacturing precision, and rugged construction that go into the production of the Canton Binfeed Stoker would produce an excellent stoker under any standards. But Canton has added exclusive features that provide a superior product which delivers a superior performance.

A binfeed stoker may be your answer to higher firing efficiency. Call or write your nearest Canton Stoker representative. He will be glad to show you, without obligation, how Canton Binfeed Stokers will fit your requirements exactly.

CANTON STOKER CORPORATION
Andrew Place, S. W., Canton, Ohio
CANADIAN REPRESENTATIVE: Volcano Ltd.,
743 Mountain Street, Montreal 3, Quebec
EXPORT DIVISION: W. B. Harkins,
751 Drexel Building, Philadelphia 6, Pa.



FREE... WRITE FOR YOURS

Canton Stoker Engineers have just blue-printed an ideal boiler room layout showing how and where today's advanced equipment should be located for greatest efficiency. Floor Plan, Side Elevation and Front Elevation drawings are of real help and ideas to you right now . . . and all the more so if you are planning to build, remodel or convert.
Write for your set, ask for TYPICAL LAYOUTS. No charge, no obligation of any kind involved.

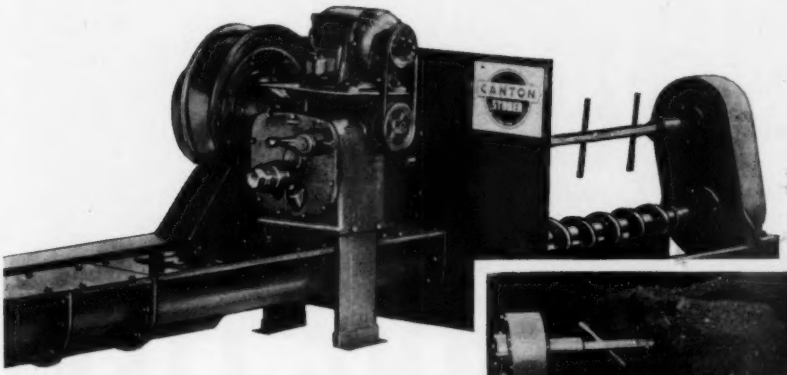
CANTON
SINCE 1910

Advancement PROBLEMS *EXACTLY!*

CANTON STOKERS

CHECK THESE POINTS

- ✔ **DUAL-DRIVE COAL AGITATOR** — Prevents packing or bridging of coal.
- ✔ **SECTION FEED WORM** — Provides easy removal for maintenance or cleaning.
- ✔ **SIDE ASH-DUMPING GRATES** — Reduces labor in cleaning fires and removing ashes.
- ✔ **ZONED AIR CONTROL** — Produces high-efficiency combustion and maximum fuel economy.
- ✔ **AUTOMATIC CONTROLS** — Provide full-automatic operation.
- ✔ **UNIT OR SEPARATE BLOWER DRIVE** — Gives added flexibility to the installation.
- ✔ **DRIVE UNIT ACCESSIBILITY** — Permits, easy, quick access to all drive parts.
- ✔ **RUGGED CONSTRUCTION** — Assures long uninterrupted service under severe operation.



CANTON DURAFLEX BINFEED STOKER

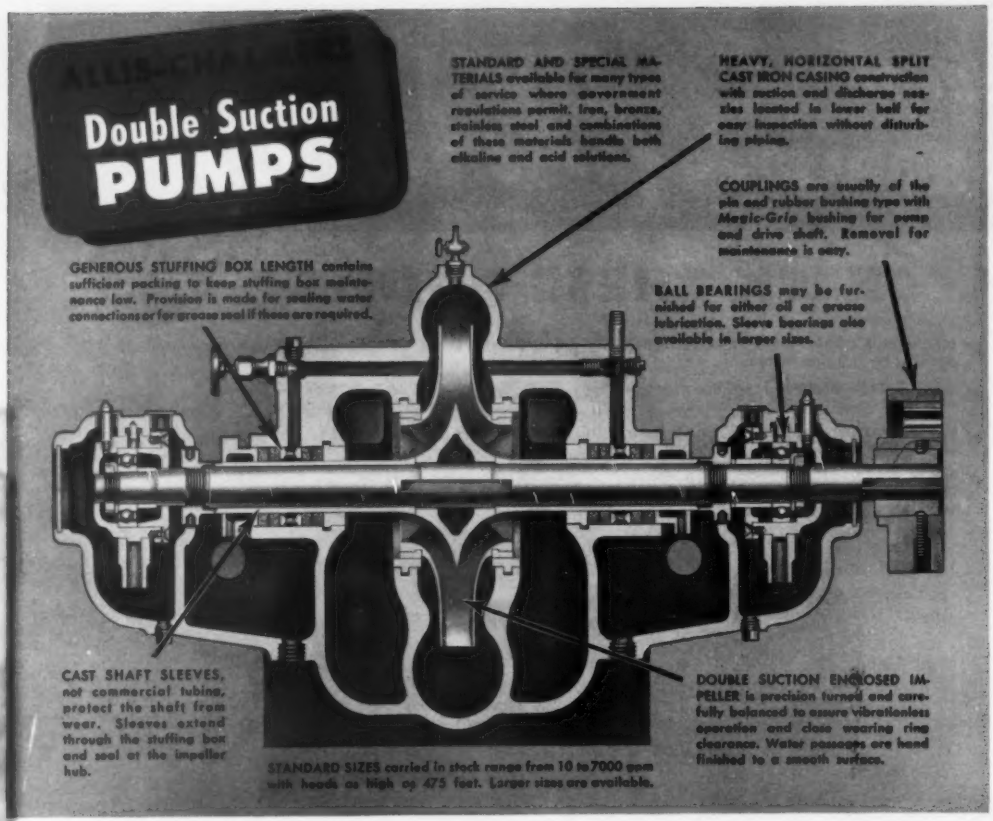
The rugged unit shown here is designed with the drive mechanism and blower units mounted at the outer wall of the coal storage bin.

Action view of the Canton coal agitator and pickup worm, showing completely closed construction of drive gear mechanism.

CANTON RAM FEED STOKER DRIVE MECHANISMS ARE GUARANTEED FOR FIVE YEARS

STOKER

CANTON STOKER CORP. CANTON 1, OHIO


Double Suction
PUMPS
STANDARD AND SPECIAL MATERIALS available for many types of service where government regulations permit. Iron, bronze, stainless steel and combinations of these materials handle both alkaline and acid solutions.
HEAVY, HORIZONTAL SPLIT CAST IRON CASING construction with suction and discharge nozzles located in lower half for easy inspection without disturbing piping.
COUPLINGS are usually of the pin and rubber bushing type with Magic-Grip bushing for pump and drive shaft. Removal for maintenance is easy.
GENEROUS STUFFING BOX LENGTH contains sufficient packing to keep stuffing box maintenance low. Provision is made for sealing water connections or for grease seal if these are required.
BALL BEARINGS may be furnished for either oil or grease lubrication. Sleeve bearings also available in larger sizes.
CAST SHAFT SLEEVES, not commercial tubing, protect the shaft from wear. Sleeves extend through the stuffing box and seal at the impeller hub.
DOUBLE SUCTION ENCLOSED IMPELLER is precision turned and carefully balanced to assure vibrationless operation and close wearing ring clearance. Water passages are hand finished to a smooth surface.
STANDARD SIZES carried in stock range from 10 to 7000 gpm with heads as high as 475 feet. Larger sizes are available.

Built for LONG LIFE

HEAVY DUTY CONSTRUCTION—no skimping, no corner cutting—is what you can look for in Allis-Chalmers Type S pumps. Extra metal thicknesses, extra strong parts, extra construction features, and extra careful workmanship are always there to give you long life, low maintenance and low cost per gallon pumped.

Every Allis-Chalmers double suction pump is carefully tested on the most modern pump testing equipment in the industry. Each installation is individually engineered by men whose experience in thousands of pump installations will give exactly the right pump for your needs.

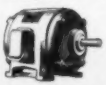
Allis-Chalmers can take full responsibility for your pumping operation because Allis-Chalmers can furnish the complete installation — pump, motor, control and drive—all built of coordinated design by one manufacturer. Efficient operation is assured and maintenance costs are kept low.

Whatever your pumping problem, call your nearby Allis-Chalmers Authorized Dealer or District Office. Or write to Allis-Chalmers, Milwaukee 1, Wisconsin, for Bulletin 08B6146. A-3580

Texrope, Vari-Pitch and Magic-Grip are Allis-Chalmers trademarks.

Sold . . .
Applied . . .
Serviced . . .

by Allis-Chalmers Authorized Dealers, Certified Service Shops and Sales Offices throughout the country.



MOTORS — ½ to 25,000 hp and up. All types.

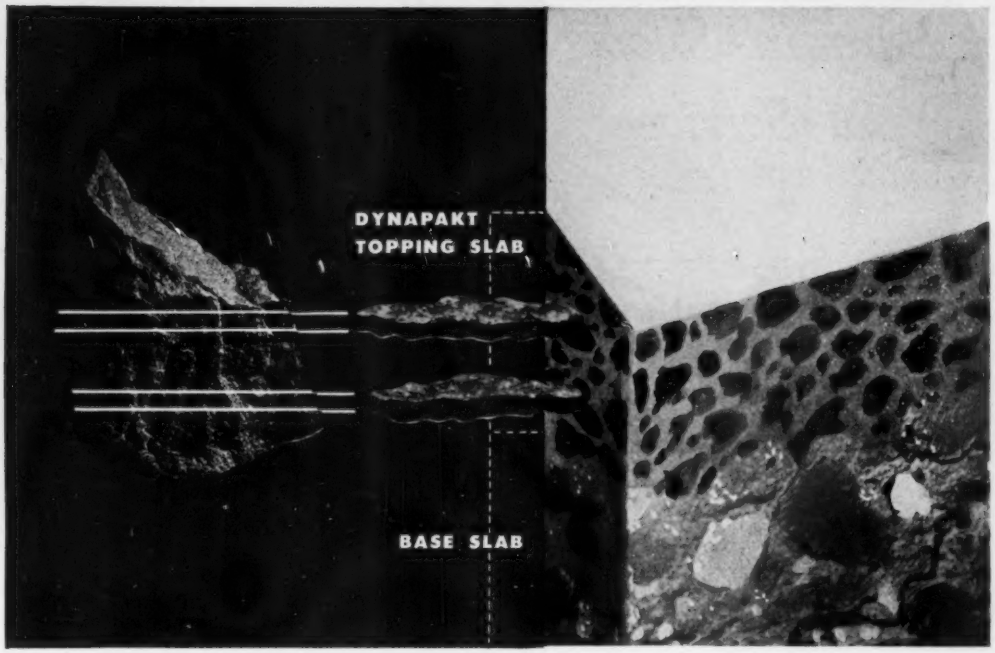
CONTROL — Manual, magnetic and combination starters; push button stations and components for complete control systems.

TEXROPE — Belts in all sizes and sections, standard and *Vari-Pitch* sheaves, speed changers.

FREE slide films on pump theory, application and maintenance. Ask your Allis-Chalmers representative.

ALLIS-CHALMERS

...the concrete most like solid rock!



LOW WATER RATIO CONCRETE... power-packed TO GREATEST DENSITY

Resistance to wear, in industrial floors, is determined not by materials alone. Installation methods are even more important.

New developments in installation methods as well as correct material formulation, both based on years of experience, make possible DYNAPAKT concrete floors of unprecedented long and trouble free life. *Investigate today.*

Ask for your copy of the DYNAPAKT story. Twenty pages of illustrated data tells how this efficient traffic concrete can be easily, quickly and economically obtained.

FLASH-STONE COMPANY, INC.
3723 pulaski avenue, philadelphia 40, pa.
specialists in floor materials, design and installation

Don't Bargain-Shop for Service . . .

It takes *more* than on-the-spot repair to provide sound maintenance for heavy electrical equipment. *Real* service economy comes when Field Repair is *coupled* with Field Inspection—handled by factory specialists who will catch potential trouble early . . . take protective steps now. This combination is *Field Service.*

This is why Westinghouse operates 46 Field Service offices, and staffs them with experienced apparatus engineers. Through them, a part of the headquarters factory moves into your plant to inspect and test, adjust or repair your apparatus . . . and recommend major overhauls when they are needed. These engineers use the most modern repair and testing equipment. They can do the entire job—or will work with your own personnel.

Field Service, however, is only one phase of a *complete* maintenance program offered by Westinghouse. It also operates 31 Renewal Parts Warehouses, stocked with precision-built parts . . . plus a network of 36 Repair Plants, expertly manned and equipped for *all* types of electrical apparatus repairs.

CALL WESTINGHOUSE FOR A COMPLETE MAINTENANCE SERVICE

SEE TELEPHONE LISTING ON PAGE 42

Field repair alone . . . is not enough !

These services are backed by factory-tested methods, factory-approved materials, factory-trained specialists. They offer the finest in *service protection* . . . the best in *service economy.* Your proof is in the performance of the completed job.

For more information, write today for a free copy of Westinghouse Maintenance Booklet, B-4766. It's loaded with facts and illustrations covering the complete Westinghouse Maintenance Service. Send your request to: Maintenance Sales Dept., Westinghouse Electric Corp., East Pittsburgh, Pennsylvania. J-95159

. . . MATCHED TO YOUR NEEDS

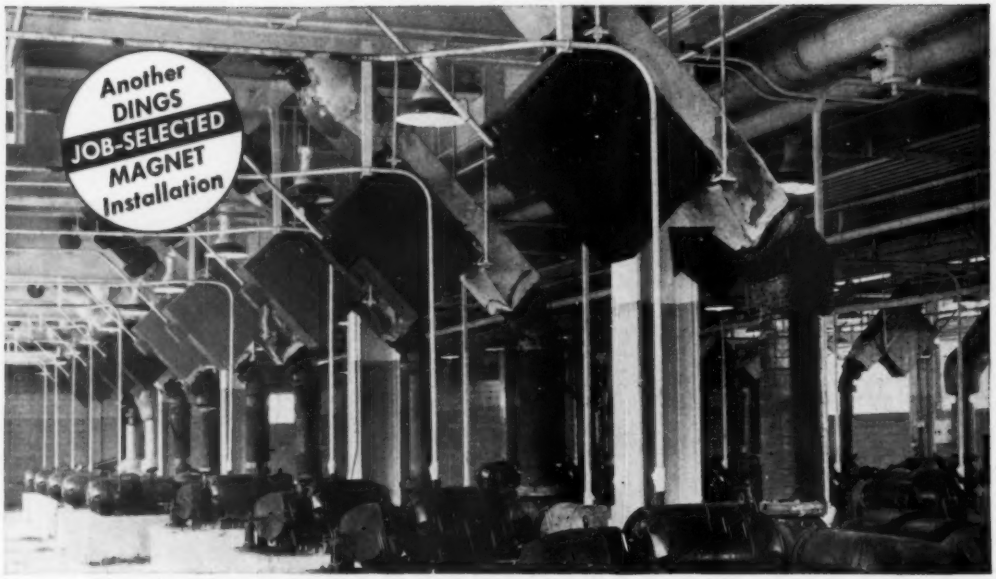
YOU CAN BE **SURE** . . . IF IT'S

Westinghouse

COMPLETE MAINTENANCE SERVICE

SHOP REPAIR FIELD SERVICE

GENUINE RENEWAL PARTS



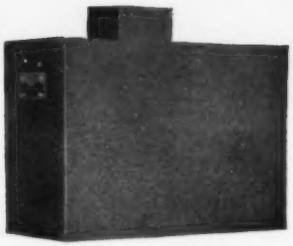
Threat to $33,000 Removed by Dings Magnets

Acetate Plant Gets Surprise; Unloads 20 lbs. of Iron

A chemical pump has no palate for iron—a single nut or bolt can wreck it. When a large acetate plant installed 30 Dings watertight rectangular electro-magnets—one ahead of each pump—they were protection conscious—said they'd be surprised and satisfied if the whole battery found one or two bolts total. In 4 months, the Dings Magnets extracted over 20 lbs. of tramp iron . . . enough to wreck all thirty pumps . . . $33,000 worth!

This plant achieved its objective to a degree beyond expectations. Three factors were responsible: (1) applying exactly the right magnet for the job; (2) the magnet itself was highly engineered and quality built; and (3) the magnet was correctly installed. Whatever *your* tramp iron problem, those are the things you buy when you buy a Dings "Job Selected" Magnet. Investigate today.

Dings Magnetic Separator Company
4766 W. Electric Ave., Milwaukee 46, Wis.
World's Largest Exclusive Builder of Magnetic Separators



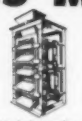
THIS IS THE TYPE THAT DID THE JOB. *The magnet that fit this job best is a Dings Rectangular (electro), a particularly versatile magnet which is effective at distances up to 18". Its triple pole design makes it effective on the most difficult jobs; fast moving conveyor belts, wet, sticky material, etc. Can be adapted in any number of ways to suit particular requirements. Catalog 301-A gives details.*

This Catalog Helps You to "Job Select" a Magnet
Is the material you want de-ironed solid . . . semi-solid . . . liquid? Is it carried in chutes . . . ducts . . . conveyor belts? Catalog 5000-B lists Dings complete line by application, describes all Dings magnets from the low cost, non-electric "Perma" Plate magnet to the most powerful magnetic separators known. Send for it today.

DINGS MAGNETS

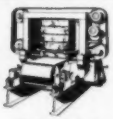
OTHER DINGS MAGNETS

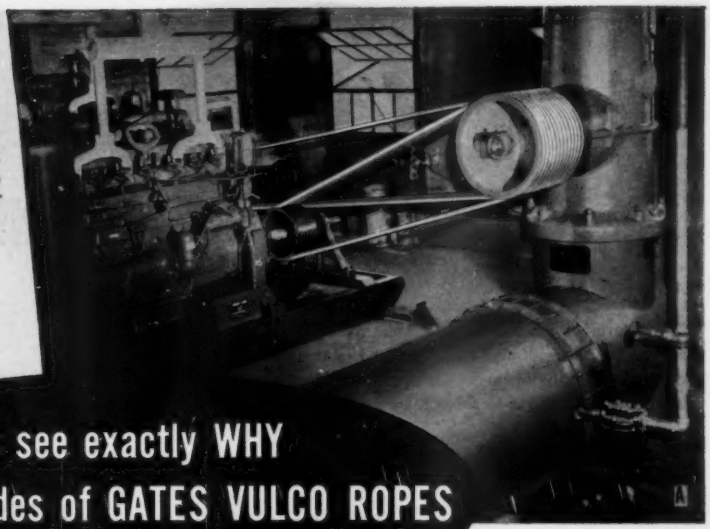
Non-Electric Plates


High Intensity Induced Roll

Non-Electric and Electric Pulleys

Non-Electric Drums

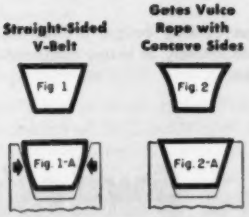

High Intensity Type EBK Crossbelt



To drive one of the new high capacity pumps which removes surface water and runoff from 15,000 acres of Illinois farmland, members of the District Board chose Gates Vulco Ropes, running from two diesel units.

Let's see exactly WHY the Concave Sides of GATES VULCO ROPES mean lower V-Belt Costs!

What Happens When a V-Belt Bends



New Straight-Sided V-Belt Bulges in Sheave-Groove. Sides Press Unevenly Against V-Pulley Causing Extra Wear At Point Shown by Arrows.

The Concave Sides Fill out to a Precise Fit in the Sheave Groove. No Side Bulge! Sides Press Evenly Against the V-Pulley—Uniform Wear—Longer Life!

Every engineer knows how a V-belt *changes shape* when it bends around a pulley.

The top of the belt is under tension—making it grow *narrower.*

The body is under *compression,* causing the sides to bulge out!

Look at figure 1-A in the diagrams, herewith. There you see how a *straight sided* V-belt is forced to bulge in its sheave-groove—and this bulging naturally causes extra wear along the middle of the sides as indicated by the arrows.

Now look at the figure 2-A. There you see how the precisely engineered Concave Sides fill out to an exact fit in the sheave groove.

Clearly, the Concave Sides press *evenly* against the V-pulley. This means uniform wear; longer life! The Concave Sides have *full traction;* wear longer because of *full contact!*

To sum up: The Concave Sides of Gates Vulco Ropes (U.S. Patent No. 1813698) give you (1) Less wear, (2) More pulley contact, (3) More sure power transmitted when needed!

Only V-belts made by Gates are built with concave sides. Whenever you buy V-Belts, be sure you get the V-Belt with the Concave Sides—The Gates Vulco Rope!

CS-521

World's Largest Maker of V-Belts

Gates

Hose · V-Belts
Molded Rubber Goods
for Industry

VULCO ROPE DRIVES

ENGINEERING OFFICES AND JOBBER STOCKS IN ALL INDUSTRIAL CENTERS

THE GATES RUBBER COMPANY • DENVER • U•S•A

new specialized and buyers in

now available

These services are designed to make the buying and selling of materials and equipment faster and less costly, by means of improved techniques in the design and distribution of printed product information.

The Bassick Company

for sellers

to the plant engineering market

If you need a new catalog—

you can have it expertly designed by men who have produced many outstanding catalogs for leading manufacturers whose products are bought by plant engineering men;

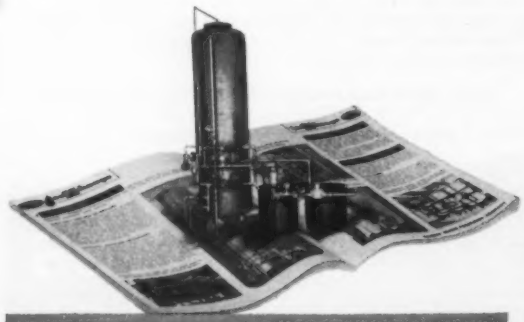
you can have it expertly printed, at moderate cost, by an organization which handles more manufacturers' catalogs than any other—in 1951, over *thirty-eight million copies.*

If you need effective distribution for your catalog—

you can have it delivered to 30,000 selected specifiers and buyers of materials and equipment in 20,000 plants;

you can have it delivered in either of two ways—(1) by mail, or (2) pre-filed in **PLANT ENGINEERING FILE**, a bound, indexed collection of manufacturers' catalogs.

You can order these catalog design, production or distribution services separately, or in any combination, as your needs require.



Illinois Water Treatment Company

Sweet's

Sweet's has designed, produced and distributed catalogs for hundreds of manufacturers whose names are known throughout industry. All of this experience and Sweet's complete facilities will be used to get the right information on its clients' products in the hands of qualified plant engineering men.

catalog services for sellers the Plant Engineering market

through Sweet's Catalog Service

The Rapids-Standard Co., Inc.

for buyers

of materials and equipment

Many people on the buying side and on the selling side of the plant enginering market have expressed the need of a *pre-filed* catalog distribution service exclusively for this field. Therefore, Sweet's believes that most of the manufacturers who employ any of its services in connection with special catalogs for plant engineering men, will also choose to have Sweet's distribute those catalogs in pre-filed form, via PLANT ENGINEERING FILE.

So, whenever you need up-to-date buying information—

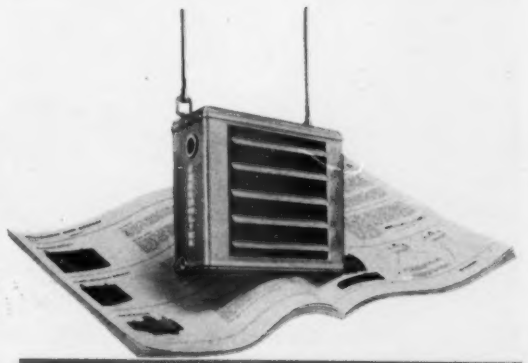
you will have a comprehensive file of catalogs of leading manufacturers, in bound form, from which you can readily compare types and makes, and select the companies whose sales representatives you wish to see.

PLANT ENGINEERING FILE will contain information on materials and equipment used for:

air conditioning	lighting	power application
communication	lubrication	production
construction	materials handling	refrigeration
heating	plant maintenance	safety
instrumentation and control	power generation	sanitation

Distribution of PLANT ENGINEERING FILE is scheduled for the fall of 1952. (NOTE: *until then, please refer to your current Sweet's File.)*

The Ohio Gear Company



Grinnell Company, Inc.

Catalog Service

DIVISION OF F. W. DODGE CORPORATION

119 WEST 40TH STREET,

NEW YORK 18, NEW YORK

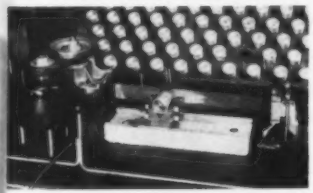
PLANT ENGINEERS' DIGEST so those who rush may read and know what's new

Edited by E. B. Skubik

Piston Tops Are Filed Faster

IT WAS customary to file small compressor piston tops by hand at the York Corp. plant of York, Pa. This has been changed since one of the employees, Donald Raver, thought of an idea to improve this operation.

He rounded up a spare housing from a compressor, a file, and a few other odds and ends. These were assembled according to plan and the net result was a mechanical filing device. The equipment that materialized out of an idea now shortens the time it takes to perform the job and helps to make the pistons more accurate. *From Shop News, published by the York Corp., York, Pa.*



V-block supports the piston as the motor-driven file works against its top

Thin Shell Molds Save Metal

METAL CONSERVATION is an extremely important advantage of thin-shell foundry molds produced by the improved "C"-Process. Documented foundry reports indicate that the process reduces the amount of metal poured per casting by at least 5 per cent. It also cuts down machine work required by the conventional green sand method, and provides tolerances that have been held to 0.003 to 0.004 in. per inch.

The process uses phenolic resins to bond sand in thin-shell molds that are light, porous, resistant to heat and moisture, and produce castings to close tolerances. In the process, the molding is made by applying a thin coating of a mixture of sand and phenolic bonding resin to a heated metal pattern and baking it hard to form a half mold. Molten metal is then poured into the cavity formed by two matching molds. The heat of the casting metal carbonizes the resin and breaks down the sand bond, enabling easy shakeout.

Items 1 and 2 are half molds made by the "C"-Process. Tree casting (3) was produced in this type of mold. Couplings 4 and 5 are products of green sand and process molds, respectively

The resulting casting requires less machining to finish. Because these shell molds can be held to tolerances of 0.003 to 0.005 in. per inch and cores shift less in these dimensionally stable molds, foundry increments that formerly amounted to an additional 0.0156 in. of metal in green sand castings have been reduced to 0.003 to 0.004 in. per inch. *From Bakelite Review, published by the Bakelite Co., New York, N. Y.*

Material Is Not Too Hot to Handle for This Eager Beaver

Slag and burned-out brick are removed while still hot. An open hearth furnace can be cleaned in a fraction of the time required by hand shoveling. (From Photo Service, a publication of Allis-Chalmers Tractor Div., Milwaukee, Wis.)

Process Stretches Tin Supply

STEEL COMPANY scientists have discovered how to make 20 to 100 per cent more tin plate than heretofore without using any more tin.

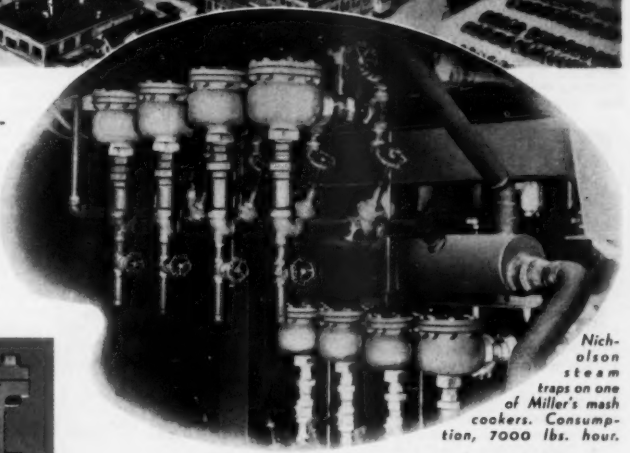
Two steel companies are now producing "differential coated" electrolytic tin plate for food cans and other uses. This tin plate has the required amount of tin on one side to withstand the corrosive action of the contents and only enough tin on the other side to withstand the much less corrosive action of the atmosphere and of processing.

The new type of tin plate is made on an electrolytic tinning line of the horizontal type which deposits tin on one side of the strip at a time. The cells of the plating section can be operated independently. They can be turned on and off to produce the desired weight of tin coating on either side of the steel.

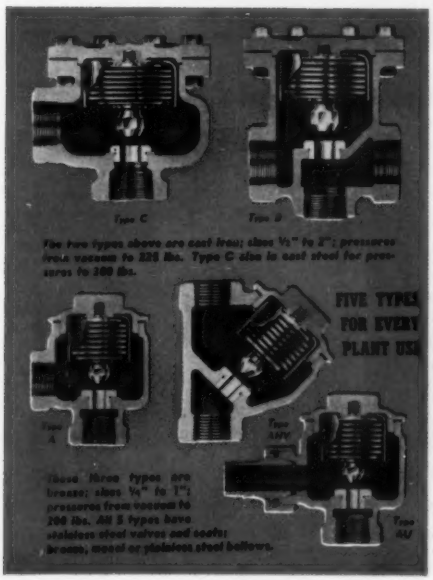
Differential coated tin plate is marked with a diamond shaped design printed on the thinly coated

NICHOLSON TRAPS SELECTED for New Miller Brewery

A giant $25,000,000 building program, which started in 1945, has made this Milwaukee home of nearly century-old Miller High Life beer one of the most scientifically advanced breweries in the nation. Dominated by the towering 200-feet high brew house, this vast 28-acre plant has a daily capacity in excess of 4,000,000 bottles and cans. Miller has adopted Nicholson thermostatic steam traps almost 100%. It is significant that this outstanding brewing firm, like many leaders in the other processing industries of the nation, has chosen Nicholson traps. To see why leading plants are increasingly standardizing on Nicholson steam traps for positive drainage and faster heat transfer . . . .



Nicholson steam traps on one of Miller's mash cookers. Consumption, 7000 lbs. hour.



Send for CATALOG 731

Contains installation diagrams and data for determining proper size of trap.

W. H. NICHOLSON & CO.

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Sales and Engineering Offices in 53 Principal Cities

PLANT ENGINEERS' DIGEST

(Digest begins on page 26)

side for quick identification. The pattern is in palm oil laid on by a specially designed automatic printer. *From Steel Facts, published by American Iron and Steel Institute, N. Y.*

Economy in Rubber Processing

CRUDE RUBBER before it reaches the compounding stage has to have some of the snap and bounce taken out of it. At the B. F. Goodrich plant in Akron, Ohio, this is done by a machine called the Plasticator.

From this machine the rubber moves in a continuous strip to a soaping unit. There soapstone solution is applied to prevent the rubber from sticking together when loaded on skids.

It was here in the soaping process that the waste problem existed. The soaping solution dripped off the rubber into pans and formed into a

Solution drippings mix with water in trough under conveyor and are re-used

sludge. This had to be scooped out and placed in buckets which had to be trucked to the disposal area.

A new system has remedied all this. A trough, through which water is continuously circulated, has been set up underneath the conveyor. The drippings therefore drop into the circulating water with which they are mixed until the proper consistency is reached. Then the solution is used again to soap more crude rubber coming from the Plasticator.

In this way not only is the time and labor of removing and carrying away the sludge saved, but the solution is used over and over again. *From the Circle-News, published by the B. F. Goodrich Co., Akron, Ohio.*

Group Lamp Replacement

EXCELLENT RESULTS have marked the group lamp replacement program which has been underway for some time at the Boeing plant in Seattle.

At the rate that the lamps are burned at this plant, their life expectancy has been set at 7,500 hours spread over a 3 year span. It has been found, however, that the mortality curve takes a definite drop at the end of 2 years, while the corresponding maintenance curve swings up.

As a consequence, a decision was made to make the group change at the two-thirds mark—every 2 years, or at the end of 5,000 burning hours. So far, 8,000 lamps have been group replaced. The plan proved to be so successful from an economy standpoint as well as convenience, that it will be carried out wherever practical throughout the plant.

The actual dollar saving is substantial. More difficult to measure are the obvious additional advantages of freedom from work interruptions by lamp changers, and the even, efficient distribution of light from lamps that haven't been allowed to get that "tired look." *From an article by Cecil Tice in the Magazine of Light published by the Lamp Div. of the General Electric Co., Nela Park, Cleveland.*

Free Fire Prevention Show

A NOVEL idea was used to bring fire prevention to the attention of the Monsanto Chemical Co.'s Plastic Div. employees. A display called the "Hot Spot Theatre" was set up on the plant grounds; the following billing promoted the show: That Dynamic Thriller, "Explosive Vapors"; Plus a Hot Second Feature, "Disconnected Ground Wires"; Also, a Short Flash, "Exposed Light Bulb."

The left section of the theatre presented two pictures. One was that of a plant untouched by the ravages of fire and the other showed what remained of a plant after a

There's no comedy in this theatre but a serious feature on fire prevention

blaze. Captions under the respective photographs carried the following reminders: "Let's Keep Our Plant Like This—By Preventing This."

The center portion of the display featured some of the factors that are potential contributors to a vapor explosion; these have been mentioned in the introductory paragraph.

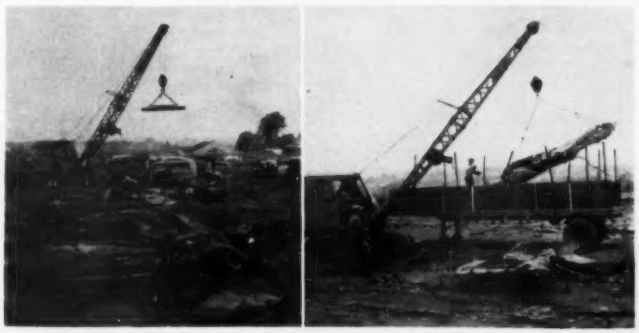
The right side of the theatre listed some tips that are good to remember when handling solvents. These are: use safety cans; be sure ground wires are connected; use vapor proof globes on lights.

The practice box at the extreme right was for the curious. In order to find out how the "Hot Spot Theatre" works, a sign below the box directed them to pull the hook. *From The Sentinel, a publication of the Factory Insurance Association, Hartford, Conn.*

Paying Substitution

THE METAL forging furnaces at the General Electric Co.'s River Works, West Lynn, Mass. operate at a temperature of 1950 F. Under the high temperature conditions the furnace doors didn't last very long. The gray cast iron deteriorated quite

Two-Ton Weight Flattens Junked Cars for Steel Mill Shipment



To help alleviate the critical shortage of iron and steel scrap, Bethlehem Steel Co. has recently developed a unique procedure for bringing out scrap from automobile graveyards. After a car has been stripped of parts, tires and non-ferrous materials, it is flattened by a 2-ton armor plate dropped from a crane. The company is making the procedure available to the scrap industry and is supplying complete information on the technique to all interested. (From Bethlehem Review, published by Bethlehem Steel Company, Inc., Bethlehem, Pennsylvania)

OIL-FREE COMPRESSORS

VACUUM PUMPS and BOOSTERS

Right above: Five JOY WNO-112 Oil-Free Compressors for pressure-testing of food containers, oil-free ejection of metal stampings, paint spraying and general oil-free processing service.

Left foreground: Three JOY WGV-9 Vacuum Pumps handle the job of vacuum feeding of metal sheets.

Left background: These three JOY WGB-9's boost gas pressure for the burners in the soldering process.

WBD 1-4016

giving highly satisfactory service in a large Midwestern Can Factory

For dependable *oil-free* air, day in and day out—as you may need it for any chemical processing or other special operation, or on that exacting instrument control job—there's a JOY OIL-FREE Compressor to meet your particular requirements. Dual Cushion valves, surface-hardened wearing areas and replaceable wearing parts are some of the exclusive JOY design features, and there's a complete line from 163 to 8800 CFM at pressures up to 100 PSI. A complete line of standard Compressors, Vacuum Pumps and Booster Compressors, too, for many different needs. Write for complete information, or . . .

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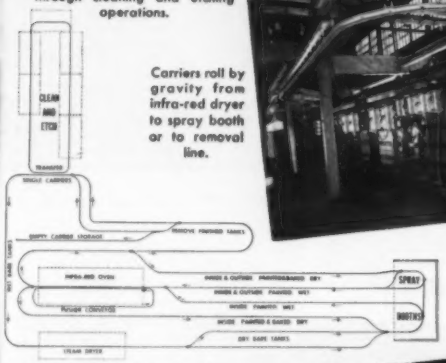

American MonoRail System for finishing water conditioner tanks at the Permutit Co., Birmingham, N. J.

Finished tanks from spray booths (rear) roll to pusher conveyor in foreground.

This installation in the Permutit Company again demonstrates the versatility of American MonoRail engineering and overhead handling equipment. Every step from cleaning and etching to finished painted tank is done by a continuous "flow" operation. The system boosted production, cut handling labor, improved space utilization, reduced material damage, bettered working conditions and improved production control.

American MonoRail engineers can show you how to increase production and lower costs in your plant. Just drop us a line.

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PLANT ENGINEERS' DIGEST

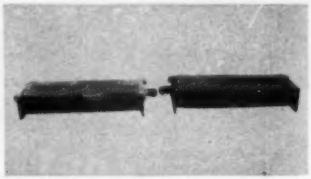
(Digest begins on page 26)

rapidly from growth, warpage and scaling.

The Thomson Laboratory of General Electric conceived the idea of using ductile iron for this application. This change of metal in the furnace doors extended their average life from 6 to 300 days. On the basis of the total number of furnaces at the forge shop, the estimated savings figured out to be $25,000 per year.

In times like the present, even more important than the monetary economy accruing to the user from such a substitution as this, are the over-all results.

Production of essential goods is increased by minimizing repair and



Furnace door on the right using ductile iron requires no repairs after 3 months' service. Note condition of gray cast iron on its left after 1 week's use

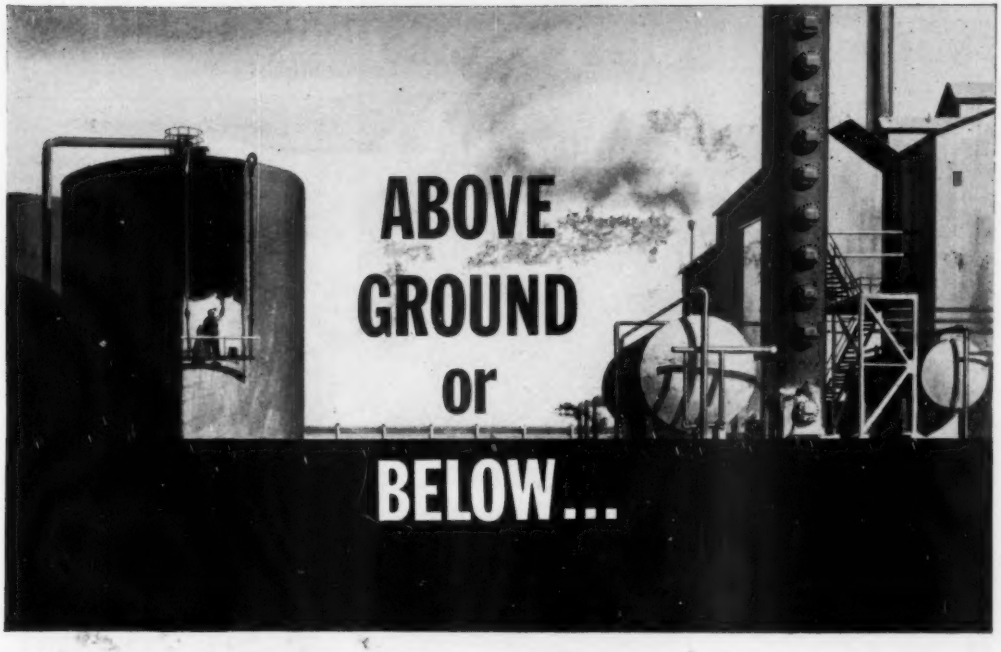
replacement of maintenance equipment, such as these furnace doors; and since all metals are in short supply, the adoption of one which multiplies service life many times contributes to conservation, in that more melting capacity may be diverted to other requirements. *From Nickel Topics, published by The International Nickel Co., Inc., N. Y.*

Microwaves for Pipelines

ROUGH WEATHER — either high winds or pole snapping ice storms—can put wire communications out of commission. For a pipeline, this may mean a costly shutdown.

When you handle 55 different grades of crude, as Humble Pipe Line does, with perhaps 5 or 6 kinds flowing through a line one behind the other, your timetable must be exactly on the button. You also must need know about leaks or breakdowns in the shortest possible time.

To insure itself against future interruption of communications due to weather, the Humble Co. made arrangements to have a microwave radio system installed. This seems destined to cause the weather problem—ice and all—to melt away. A curious facet of microwave's personality is that it actually thrives on



PITT CHEM Tar Base Coatings

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Above ground or below, you'll find Pitt Chem Tar Base Coatings ideal for preserving structural steel, tanks, underground piping, brick, masonry and stone surfaces. A single application of these economical, long-lasting coatings provides a film thickness equal to as much as *ten* coats of ordinary paint . . . and they stay on the job for *years* under conditions that usually cause ordinary paints to fail in *months*.

Pitt Chem Tar Base Coatings perform better on application and last longer because of their uniform top quality—a benefit that stems directly from our unique position as a basic and integrated producer of cold applied tar base coatings. We're able to carefully control every phase of production from coal to finished product—in a plant devoted exclusively to the manufacture of cold applied coatings. ● *We'll gladly provide more product information or technical assistance on request.*

PITT CHEM 101

A versatile, heavy duty coating that withstands severest corrosive conditions.

PITT CHEM 102

A thin, high gloss maintenance coating for steel and concrete surfaces.

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A fast drying, high gloss coating for equipment handling potable water.

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PLANT ENGINEERS' DIGEST

(Digest begins on page 26)

bad weather. When arctic gales and sleety downpours are giving wire lines a fit, conditions are usually excellent for microwave transmission.

Microwaves show many of the characteristics of light and hence, will travel for only line-of-sight distances, usually no more than 50 miles. The waves do not spread in

The paraboloid type of antenna shown atop a steel tower makes it possible for a microwave station to transmit with the power of one watt or less

all directions but are focused into a narrow beam. This invisible beam flies with rifle-shot accuracy to a repeater station, where it is boosted to its original strength and then sent winging to a new relay point.

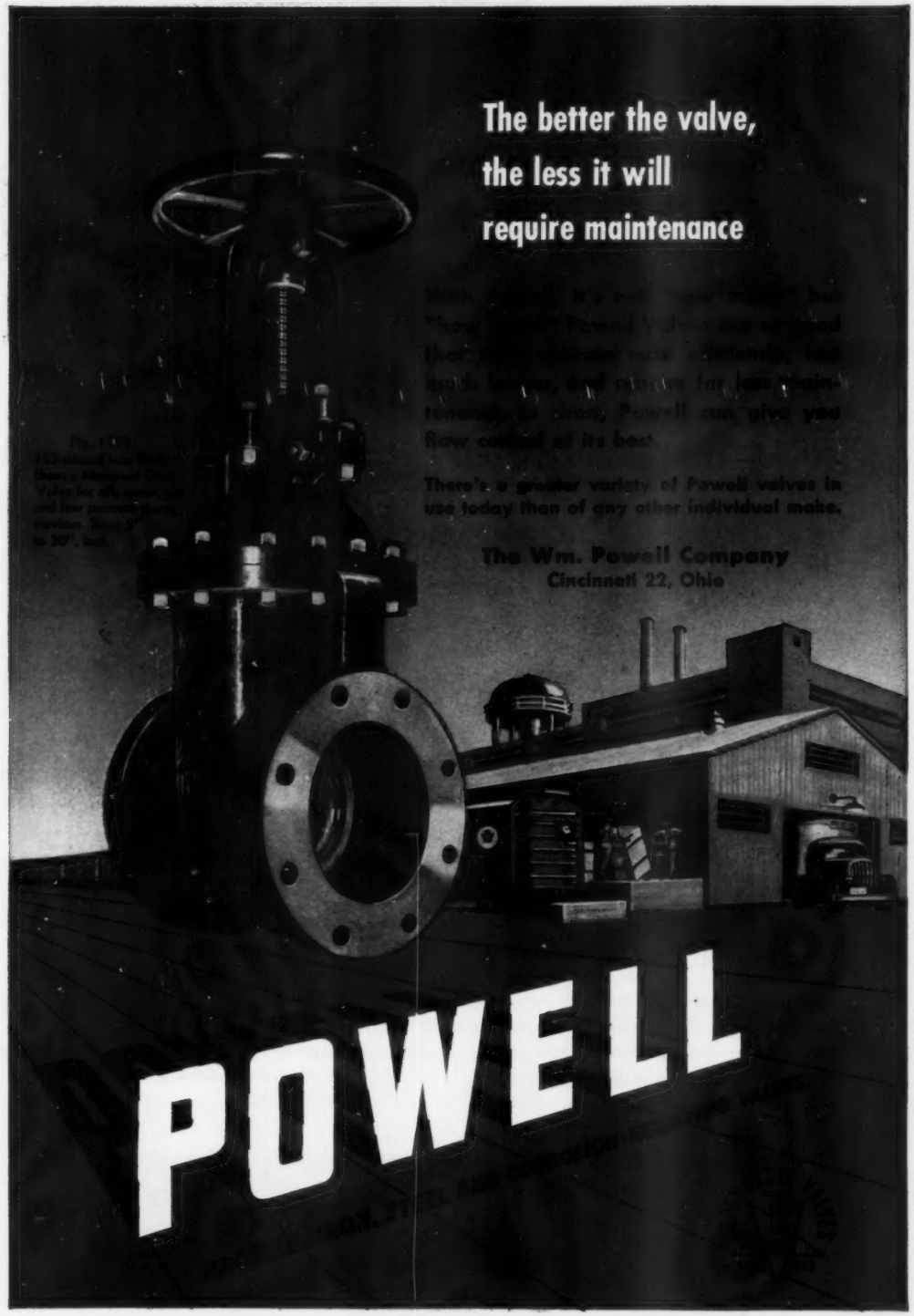
How dependable will the newly installed system be? Well, one eastern pipeline reported last year that its microwave communications were in operation 99.22 per cent of the time—this in spite of some very adverse weather. *From The Humble Way, published by the Humble Oil & Refining Co., Houston, Texas.*

Asbestos Fiber for Tank Leaks

MANY LIQUIDS are carried over long distances in railroad tank cars. Acids, molasses, syrups, edible oils, liquid pitch and fuel oil are some of the products shipped in this manner.

A lot of these liquids used to be lost because tank cars develop tiny leaks after having been in service for a while. The only way to stop the loss from a leak while a car was in transit was to shunt the car onto a siding, bring up another car, and transfer the contents of the leaking

(Continued on page 38)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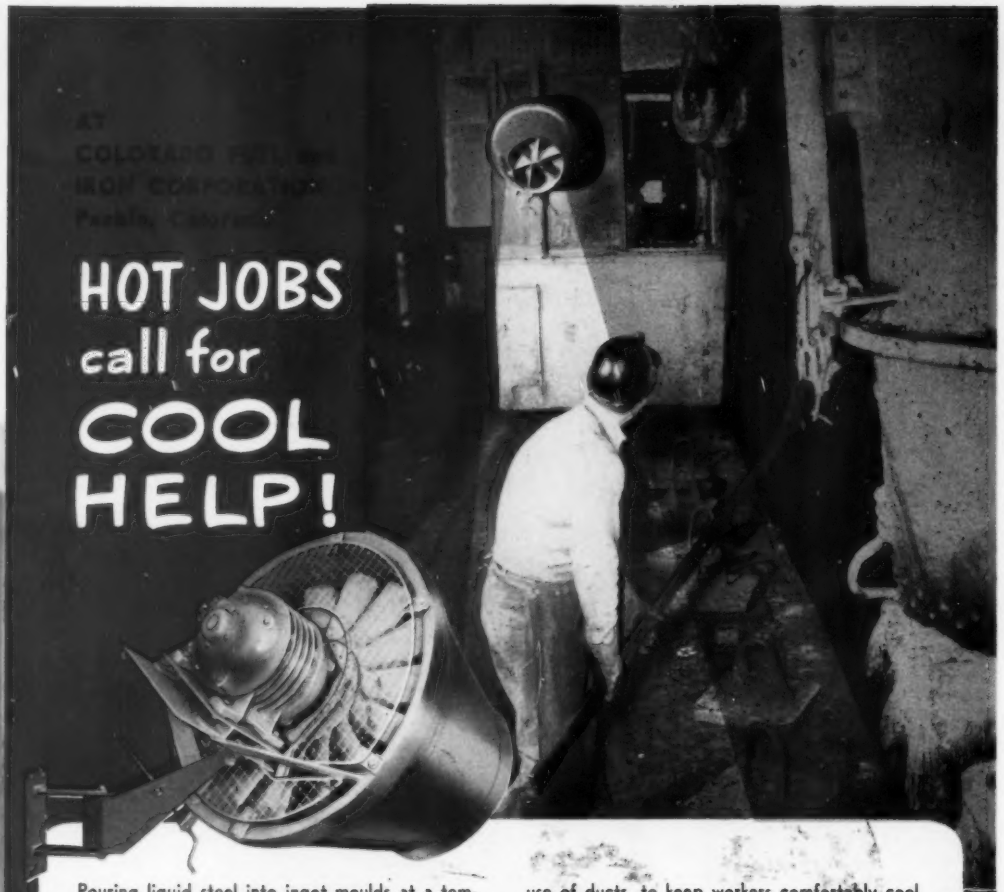

HOT JOBS call for COOL HELP!

Pouring liquid steel into ingot moulds at a temperature of 2800° F. is a hot job that demands skill and constant attention. When workmen are exposed to such intense heat, thermatic fatigue can be a real problem.

At Colorado Fuel and Iron Corporation's mill in Pueblo, Colorado, they solved the problem by mounting a DeBothezat "Hy-V" Air Jet on the cab of the crane which handles the ladle, so that the fan unit travels right with the men as they work. "Hy-V" Air Jets project a concentrated stream of fresh air as far as 35 feet, without the use of ducts, to keep workers comfortably cool, alert and efficient.

DeBOTHEZAT "HY-V" AIR JET is a 14-blade axial-flow pressure fan in a nozzle-shaped housing. It can be furnished with a bracket for wall installation or it can be mounted on a portable wheeled stand. Both types are available with fan wheels from 18" to 30" in diameter, with capacities up to 12,000 CFM.

Ask your DeBothezat Fans representative or write the factory today for a bulletin on "Hy-V" Air Jets. Address Dept. PE552.

DeBothezat Fans

Division of American Machine and Metals, Inc.
EAST MOLINE, ILLINOIS

BULLETINS just released and of immediate plant interest

INSTRUMENTS, CONTROLS

101 Fundamentals of Instrumentation—Booklet 80-2, just released, offers 126 pp of information on instrumentation in industry. Separate sections are devoted to the fundamentals of measurement and control, measurement of process variables, remote transmission of measurements, automatic controllers, power units and final control elements, control systems and panelboards. Typical applications are also discussed. Generously illustrated throughout with photos and schematic diagrams. An excellent text, available to qualified plant engineers. Please state title when requesting it. Brown Instruments Div., Minneapolis-Honeywell Regulator Co.

102 Instrument Handbook—Here's a booklet explaining insulation testing in simple language. Discusses electrical insulation, tells how it can be tested and what makes it go bad, and offers practical maintenance tips. Describes the Megger insulation tester, justifying its cost in terms of long run economy and prevention of shut-downs. Shows how the Megger functions as a trouble-shooter, explains its operation and tells how to get the most out of it. Photos, drawings and humorous sketches illustrate the text. A chapter on handling of wet equipment is included. James G. Biddle Co.

103 Flow Meters—Accurate measurement in open channels is discussed in Instrumentation Data Sheet 10.3-4. Describes operation of float actuated flow meters especially applicable where Parshall flumes and weirs are used to create a fluid head. Data given cover system arrangements, principle of operation, specifications. Brown Instruments Div., Minneapolis-Honeywell Regulator Co.

104 Flow Meter Handbook — Newly-released Publication 10596, 40 pp, is offered to aid in the selection and sizing of variable-area meters and contains, in condensed form, the results of 15 years of research. Fully illustrated, book provides a description of variable-area meters, tubes and floats and their comparison with variable-head meters, as well as calibration prediction data. Detailed selection information is included, also explanation of how to correct changes in fluid conditions. Fischer & Porter Co.

105 Tachometer Indicators — Technical Data Sheet 42 HJK describes tachometers for high accuracy speed measurements with convenience not generally available in a continuously indicating switchboard instrument. Lists applications, outstanding features. Describes principle of operation and includes selection tables, illustrations of scales. Metron Instrument Co.

106 Combustion Control—A detailed account of air-operated automatic combustion control techniques for oil and gas fired boilers is available in 24-pp Bulletin 1023. Comprehensive illustrations and descriptions include diagrammatics showing nine typical firing methods and 16 major control equipment components. There are also individual facts and figures on 300 installations ranging from 6000 to 1,000,000 lb-hr capacity. Bailey Meter Co.

107 For Combining Control Signals—The improved design of company's Ratio Totalizer is described and pictured in color in 8-pp Bulletin 5452. This simplified, versatile mechanism is a pneumatically operated control for combining input control pressures and spring forces, and producting an output control pressure based on addition, subtraction, multiplication, division or more complicated functions of the input control signals. General and special applications are detailed. Hagan Corp.

108 Combustion Indicator-Recorder — A photo-electric relay application in the form of company's Hasegauge combustion indicator is described in 2-pp Bulletin 801. Wiring diagrams of installation and relay circuits included. Ess Instrument Co.

109 Control for Planers—Eight-pp illustrated Booklet 927 explains operational and safety advantages of impedence-electronic limit switches. Shows how they feature safer stopping and automatic reversal for planers, providing positive stopping on power failure. Several installations are pictured. The Electric Controller & Mfg. Co.

110 Remote Pressure Recorder—Instrumentation Data Sheet 10.3-5 describes a remote pressure recorder comprising the Frederick Flader Teledyne unit plus the Brown ElectroniK recorder. Applicability, equipment requirements, and operating principles are discussed. Photos of equipment, specifications for pressure transmitters, and drawings of basic types of Teledyne transmitters are included. Brown Instruments Div., Minneapolis-Honeywell Regulator Co.

MATERIALS HANDLING

111 Fork Lift Trucks — Just released, these three attractively illustrated bulletins provide dimensions, specifications and operating data on gasoline-powered and diesel-powered fork lift trucks. Bulletin 1579 covers units of 3000-lb capacity at 24-in. load center; Bulletin 1580, 4000-lb at 18-in.; and Bulletin 1581, 4000-lb at 24-in. All available to qualified plant engineers, state those wanted. The Buda Co.

112 Conveying Equipment — Now available to qualified plant engineers in this company's brochure containing literature on all equipment manufactured and a photographic story of facilities and personnel. Bound with stiff covers and plastic binding, this brochure includes all recent catalogs on belt, chain, gravity conveyors and related equipment, giving specifications, drawings, installation photos and other pertinent data. Please state title when requesting this brochure. Island Equipment Corp.

113 Power Conveyors at Work—A pictorial expose of where and how company's Streamliner power conveyors are being used in diversified industries is offered in 32-pp Bulletin 302. Illustrations depict many materials handling operations and show the most efficient arrangements of many types of power conveyors. To plant engineers faced with a conveyor problem, this picture-catalog of ideas on applications should be especially helpful. Harry J. Ferguson Co.

114 Attachments for More Profit—Form 30182, a 32-pp catalog, shows many possibilities of adapting manufacturer's diesel tractors to specific jobs. Fully indexed, explains uses and construction of each tractor attachment. Action pictures supplement the catalog views. Specifications, drawings and dimensions are provided. Included are practical and low-cost items such as cab heaters, rain traps and air precreeners. Caterpillar Tractor Co.

115 Cranes, Derricks, Hoists — To acquaint plant engineers with manufacturer's complete line of equipment, Catalog GC-2, 31 pp, covers equipment from giant revolver cranes, through hoists, material elevators, car pullers down to the well-known Crosby wire rope clips. Illustrated with plenty of on-the-job pictures, this interesting booklet provides a sort of guided tour of material handling installations throughout the world. Also includes return card for sending for literature on specific types of equipment. American Hoist & Derrick Co.

116 Elevating Towers—Complete data on single-well and double-well models of elevating towers are given in 8-pp Catalog 249. Specifications are clearly defined and rigging diagrams illustrated. Also pictured and described are all components required for erection of the towers having either 3000-lb or 5000-lb live load capacity. American-Tubular Elevator Co.

117 Cost-Cutting Ideas—Form 30 is an "idea book" picturing a wide range of pallets, skid boxes, hand trucks, trailers, hoppers and other equipment. Because of similarity in certain problems some of this equipment is being adapted to jobs far removed from those for which it was designed. It is believed this book may suggest solutions to handling problems encountered in your plant. Pab-Weld Corp.

ELECTRICAL

118 "Unitized" Switchgear — Thirty-pp Booklet B-5282 opens with an explanation of what "unitized" low-voltage metal-enclosed switchgear is, and outlines the indoor and outdoor applications for which it is suited. Describes company's Types DB and DA air circuit breakers incorporated. Includes current ratings, interrupting ratings, as well as inspection, disconnection and replacement data. Standard switchgear assemblies, universal frames and bus supports are described. Also covered are bushing-type current transformers, breaker attachments, and cascading and selective tripping. Typical specifications are listed. Westinghouse Electric Corp.

119 Constant Voltage Transformers — Booklet CV-142, 22 pp, is an up-to-date cross reference to company's constant voltage transformers, and complete guide to standard regulators and recently added types. Engineering notes and operating data are provided, also line voltage recordings of average, best and extreme conditions of line voltage—charts made from a survey of the country's line voltage conditions to specific jobs. Fully indexed, explains uses and construction of each tractor attachment. Action pictures supplement the catalog views. Specifications, drawings and dimensions are provided. Included are practical and low-cost items such as cab heaters, rain traps and air precreeners. Caterpillar Tractor Co.

May, 1952

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PLANT ENGINEERING

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ditions. All units offered are illustrated and there are charts showing performance, harmonic analyses, electrical and mechanical specifications. Bulletin is punched to fit 3-ring binders. Scia Electric Co.

120 D-C Power Supply—Bulletin V1051 covers in detail company's Varicell, a source of variable stabilized-regulated d-c voltages operating from a-c power lines. Photos, circuit diagrams, outline dimensions, ratings and descriptive data are provided. Purpose of this voltage source is explained, illustrated with circuit diagrams. Easy operation of the equipment is discussed. The Superior Electric Co.

121 Motors, Controls for Chemical Industries—Each of eight sections in 33-pp Booklet B-4792 treats a general application problem common to the chemical industry —corrosion, hazardous locations, outdoor service, how-to-get centralized control, etc. —and shows how the co-ordinated application of motors and controls provides the solution. Internal and external construction details of available motors and controls are described and illustrated by cutaways, sketches and photos. Westinghouse Electric Corp.

122 Snap-Action Switch—Data Sheet 63 presents a "make-before-break" snap-action switch, describing in detail, with diagrams, the function of the two moving contacts in closing the normally-open circuit before the normally-closed circuit is opened. Points out how the make-before-break principle insures continuity in operation of an electrically-controlled multi-stage machine. Characteristics, electrical ratings and dimensions of the switch are covered. Three terminal designs and a few of the many actuator designs with which the basic switch may be equipped are included. Micro Switch.

123 Electric-Circuit Controller—Functions and applications of the Regohm direct-acting, finger-type voltage and current regulators are analysed in Engineering Bulletin 505.00, 12 pp. Tells how this type of regulator works to provide close control of voltage, frequency and current, and how it can be used in servo systems. Typical circuits included. Electric Regulator Corp.

124 Lava Insulators—Now available as "source" books are two booklets detailing technical data on properties, grades, thermal resistance of Lava insulators. Lava is a kiln-hardened natural steatite, and these insulators are produced according to individual specifications. Booklet A treats insulators for electronic tubes; Booklet B treats the insulation more generally and covers its use in a number of industries. State choice or both. M. Kirchberger & Co., Inc.

125 Insulation Testing Information — Now available to plant engineers are articles describing recommended test procedures and practices using d-c method of insulation testing on high voltage electrical apparatus. As this method is considered a valuable tool for determining actual condition of the insulation, the articles are worthwhile reading for those concerned with operation and maintenance of high-voltage equipment. The John Hewson Co.

126 Selenium Rectifier Stacks—Booklet GET-2350, 28 pp, describes basic characteristics and applications of selenium rectifier stacks. Provides charts, graphs and tables illustrating principles of rectification and characteristics, manufacture, circuit design and application of selenium rectifiers. General Electric Co.

127 Compression Joints—Bulletin 67 is a 32-pp catalog covering company's compression joints for copper and aluminum cable and showing new aluminum connectors as well as copper fittings. Features company's well-known Waterseal lugs, now designed for new, small diameter cables. A handy table shows government stock numbers and equivalent catalog numbers. Several pages are devoted to hydraulic installing tools which develop pressures to 20 t and 40 t. Provides a new illustrated quick-ordering chart covering all standard connectors. The Thomas & Betts Co., Inc.

128 Vertical Induction Motors—Construction features and types of large vertical induction motors for pumps and other vertical drives are described in Bulletin 05B7629. Explains that except for bearing arrangement, the mechanical construction of vertical solid shaft induction motors is basically the same as that of horisontal units, and while customarily open, self-ventilated types, they can be provided with enclosures. Covers motor ratings in 40 C 60 cycle from 60 hp, 200 rpm, to 800 hp and larger at 1800 rpm. Allis-Chalmers Mfg. Co.

MAINTENANCE AND CONSTRUCTION

129 How to Save Old Roofs—A 16-pp booklet, "Saving Old Roofs," shows how periodic maintenance can prolong life and bring an old "worn out" roof back to life. Outlines company's roof maintenance system, pointing out how most leaky roofs can be restored, and telling how high outside labor costs can be avoided. Details each step in preparation of the roof and application of roof maintenance products. Patching of holes and breaks in different types of roofs, repair of flashings, what to look for and where to look for concealed leaks and future trouble-making factors, and how treatment with a re-saturant can restore a "dead" roof are discussed. The Tropical Paint and Oil Co.

130 Good Treatment for Roofs—Illustrated with photos and sketches, Bulletin L-3201 discusses the drying effects of sun and weather on roof coatings and explains how company's Seal-Kote (liquid asphalt and asbestos) penetrates and seals roofing surfaces and prevents composition roofing from drying out, cracking and leaking. Also describes a plastic roof cement for repairing cracks, blisters and holes; and a saturant for excessively dry surfaces. Paramount Industrial Products Co.

131 Daylight for Industry—How to achieve better daylighting conditions in industrial plants through the use of prismatic glass block is described in this 24-pp booklet. Based on research and experiments as well as practical experience, it presents a non-technical explanation of the functions and advantages of controlled daylight. Shows how, by directing light upward, glass block serves to reduce glare and harsh contrasts and distribute light more evenly over an entire area. American Structural Products Co.

132 File of Scaffolding Data—Now available to qualified plant engineers is the revised, 1952 edition of company's Waco file folder, a package file including standard literature, catalog sheets and test data on steel scaffolding equipment. This folder serves as a permanent file for future mailings (made to file folder holders) of company's literature and other information pertinent to scaffold erection, use, safety measures. Please state title when requesting file folder. Wilson-Albrecht Co., Inc.

133 Improved Water Repellent — This illustrated bulletin describes Flexseal, a new silicone-base water repellent for use not only on brick and concrete surfaces, but also on sandstone, limestone, stucco and asbestos-cement combinations, etc. Stresses advantages over water repellents which act only as surface coatings; explains how Flexseal penetrates masonry without plugging the pores. Technical data and instructions for application given. Building Maintenance Div., Flexrock Co.

134 Tile in Industry—Unsightly washrooms are a major cause of personnel trouble, according to surveys referred to 20-pp booklet 300. Shows how employee morale can be improved and maintenance costs reduced by proper planning of installations using tile walls and floors. Illustrated with color photos of actual installations—washrooms, locker rooms, showers, kitchens, cafeterias — contains helpful information on washroom planning and traffic flow. Includes specifications for practical wall and floor tile combinations. American-Olean Tile Co.

135 Industrial Doors—Slide, vertical lift, turnover and canopy doors are described and pictured in this 8-pp bulletin. Tells advantages of each type, applications for which it is best suited. International Steel Co.

136 Dry Scrubber—A heavy duty machine designed to clean grease-caked floors many times faster than by hand methods is described and pictured in this new folder. Brush construction, control, other features are illustrated. Also explains use of this machine for wet scrubbing and polishing operations. Finnell System, Inc.

137 Proud of the Plant Lawn?—Here's a timely folder describing four pesticides —a plant spray, a dusting powder, weed killer and crabgrass spray. Tells what each formulation can do, how to apply it. Standard Oil Co. (Ind.)

HEATERS, HEATING

138 Propeller Fan Unit Heaters—Twelve-pp Bulletin 1301 shows how unit heaters can solve many a space heating problem. Both horisontal discharge and vertical dis-

(Continued on page 162)

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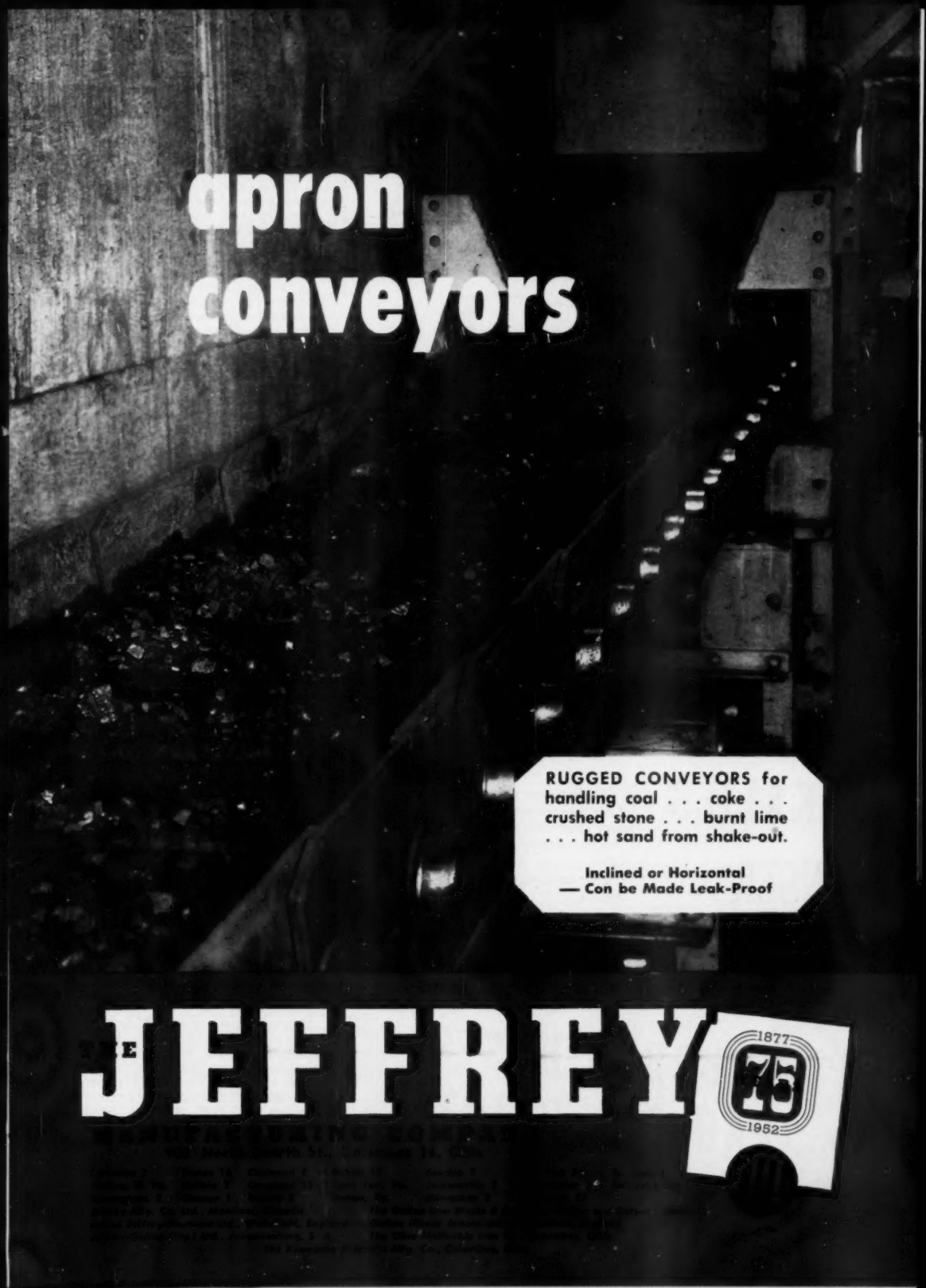
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TO SEWAGE DISPOSAL PLANTS

CHECK CORROSION FROM ACIDS AND ALKALIES LONGER WITH

Rubber-base paint covers a multitude of maintenance problems—and solves them effectively. For home or industry—in fact, wherever a severe corrosion or weathering condition exists—maintenance experts rely more and more on the protective qualities inherent in paints with a chlorinated rubber base.

These fast-drying finishes seal and protect concrete, wood, and metal surfaces against corrosive solutions, temperature changes, and humidity. They resist acids, alkalies, fumes and salts three to four times longer than ordinary coatings—making them particularly advantageous for use in sewage disposal plants where acid constantly attacks ferrous metal and masonry.

Rubber-base paint is especially durable on concrete because of its resistance to abrasion and the free alkali in cement. Ask your paint supplier about easy-to-apply and economical-to-use rubber-base paint—or write direct for details.

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RUBBER-BASE (PARLON)® PAINTS

CR52-2

PLANT ENGINEERS' DIGEST

(Digest begins on page 26)

car—an expensive and time consuming undertaking.

Some railroad man found that a small amount of asbestos fiber, put in with the liquid, would stop these pin holes, at least until the tank could be thoroughly overhauled.

As a result, the Association of American Railroads sent out a bulletin to 1500 of its members with this explanation—"The use of this substance as a leak stopper results from the fact that when it is put into a liquid it diffuses throughout the liquid and because of its fine filament size, it follows any flow or current that might be present within the tank. The currents carry it to the leak, where it mats across the crevice to form a plug." *From Hercules Filtration Fact Finder, published by Hercules Filter Corp., Paterson, N. J.*

Two-Wheeled Mouse for Motors

This is "Super Mouse," a dolly used by electric shop personnel at the Corpus Christi plant of the Corn Products Refining Co. Looks like a handy gadget. (From Yours Truly, published by the Corn Products Refining Co., Chicago)

Cold Storage Ceiling

SUSPENDED CEILINGS are common practice today when existing space is converted to cold storage rooms. Their efficiency and economy have been proved in reduced refrigeration costs.

Although there are many standard types of construction from which to choose when selecting a false suspended ceiling, the steel suspended ceiling erected by the New Era Dairy in Carbondale, Illinois, is interesting in that it varies somewhat from standard procedures.

This dairy has an adjoining freezer and milk cooler, separated by a free standing solid cork partition. Steel tee irons were first placed on 17 in. centers across the small dimension of the rooms, so that even in the case of the freezer, the shrinkage due to temperature changes would be neg-

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Kaylo Heat Insulation is a hydrous calcium silicate — a revolutionary heat-saving material — outstanding both in performance and ease of application.

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4. **INSOLUBILITY IN WATER**—Even when saturated, Kaylo Heat Insulation retains about 85% of its strength. It returns to its original strength after drying.
5. **HIGH STRENGTH**—Breakage of Kaylo Heat Insulation is almost negligible in shipping and installation—workmen can walk on insulated equipment without causing breakage.
6. **LIGHT WEIGHT**—Since Kaylo Heat Insulation weighs only 11 pounds per cubic foot, it is exceptionally easy to handle and apply.
7. **WIDE RANGE OF SIZES AND SHAPES**—Kaylo Heat Insulation's unmatched selection of sizes and shapes reduces the number of pieces required per job.
8. **EASE OF CUTTING AND FITTING**—Ordinary tools of the trade are used to install Kaylo Heat Insulation. The material is non-irritating to the skin and non-toxic.

For complete details on all of the advantages of Kaylo Heat Insulation, write Dept. N 301, Owens-Illinois Glass Company, Kaylo Division, Toledo 1, Ohio.

See our CATALOG in SWEET'S FILE

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Spiralwound Gaskets
Breathe with varying
Pipeline Stress

How much "give" to a dead piece of metal? How much bounce to the ounce of asbestos? Very little!

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But with Spiralwound, a "spring-loaded" preformed metal strip with an asbestos filler, you have a gasket that breathes with varying pipeline or boiler stresses. "The Spring is the Thing." It keeps joints tight at low bolt loads, seals irregular, pitted or warped surfaces, has enough resiliency, usually, to be used over again if the joint must be parted.

Get the spring-loaded multiple knife edge contacts of these gaskets to insure safe seals, always. Write for catalog or ask your favorite industrial distributor about them.

UGS

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PLANT ENGINEERS' DIGEST

(Digest begins on page 26)

ligible. In addition, since the tee-iron framing is within the rooms, which are held at fairly constant temperatures, there has been very little movement after the first reduction in temperature.

The tee irons rest on the inner layer of wall corkboard and are additionally supported across the ceiling by steel hangers spaced approximately 8 ft apart. The spacing of these hangers depends on the load to which the tee irons are subjected and has to be individually determined for each application. Aluminum sheets, 14 ga and 16 in. wide, were then laid on the bottom

Tee irons are spaced 17 in. on center and receive main support from steel hangers; flanges hold aluminum sheets.

flanges of the tee irons with no mechanical fastening of the sheets to the steel. The flat sheet fits tight against the flange of the tee iron and forms an even surface on top of which corkboard was applied in hot asphalt.

As the ceiling work progressed, the top of the insulation was flooded with a heavy coat of hot asphalt and a 1 in. course of Portland cement topping was applied to give structural stability.

In order to avoid electrolysis between the two metals and rust on the steel construction, several precautions were taken. First, the tee irons were painted with zinc chromate paint. Then, a coating of aluminum paint was applied. *From Armstrong's Insulator, published by Armstrong Cork Co., Lancaster, Pa.*

Leak Detector Uses Freon

A SMALL, pistol-like leak detector has minimized shut downs in a system which deodorizes more than 10,000 lb of vegetable oil per hour at the Sherman, Texas plant of Mrs. Tucker's Foods, Inc.

The deodorization process depends upon a nearly absolute vacuum. If leaks allow sufficient air to enter the system, the entire unit must be shut down. To help safeguard against this, a leak detector is now being

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Here's the most compact truck of its kind, only 26½"* long. It easily right angle stacks in 5'6" aisles. Its new, compound wound, traction motor packs twice the power in 48% less space.

Here's the answer to your cramped area handling. In receiving, production, storage and shipping, — wherever you move and stack, — it multiplies your manpower and your space.

It's the Quality Truck in the Walkie Field, — with 89 engineering advancements; Capacities up to 6,000 lbs.; Open face pallet, straddle, platform and counterbalance types.

**Plus load length.*

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For complete information, turn to page 20-21
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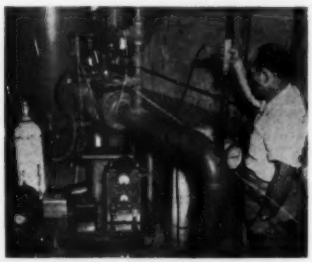
PLANT ENGINEERS' DIGEST

(Digest begins on page 26)

used to discover the leaks as they occur.

Using a portable cylinder of freon gas, a workman goes over the system spraying it with the gas. If a leak is present, the gas is drawn into the system and taken to the exhaust pipe where the G-E detector is installed. The device reacts to the freon, the horn sounds and the instruments indicate the intensity of the leak; the position of the workman shows the approximate location of the trouble.



Pistol type leak detector being inserted in process exhaust pipe to detect leak

One big advantage of the leak detector, according to the foreman in charge of deodorization, is that the system doesn't have to be shut down while testing for leaks—the freon doesn't mix with the oil, but is carried through the system along with other waste gases. *From a news release of the General Electric Co., Schenectady, N. Y.*

Well Entrenched for Loading

Trench for rear wheels lowers truck floor level to that of dock and improves loading conditions. (From Du Pont Magazine, published by E. I. du Pont de Nemours & Co., Wilmington, Del.)

Crane Carries Escape Ladder

ADVANCE PLANNING for fire safety resulted in a collapsible ladder in one of the crane cabs in the foundry of the Falk Corp. of Milwaukee.

A metal ladder box is securely bolted to the floor of the crane cab.

There are many waterfalls but . . . *only one* Niagara

There are many coatings but . . . *only one* INSUL-MASTIC

INSUL-MASTIC pioneered heavy coatings—of *superior* quality. Years of thorough testing and experimentation, by corrosion plagued chemical companies, proved conclusively that long term protection against acids, alkalis and weather was at long last possible, through the use of INSUL-MASTIC.

The government confirmed this finding—INSUL-MASTIC being the only mastic coating ever approved under the original rigid specification for "mothballing" the war materiel.

INSUL-MASTIC *superior* coatings brought about changes in coating specifications throughout industry. The extremely long life and very low moisture vapor penetration rate of INSUL-MASTIC were the qualities that industry was seeking in its fight against corrosion and moisture penetration. The proven formulae which brought this enduring protection are patented and *cannot be duplicated* . . . there is only *one* INSUL-MASTIC.

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INSUL-MASTIC Vaporseal Coatings will prevent corrosion under severe chemical conditions, and will vaporseal insulation or building walls.

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with this modern equipment

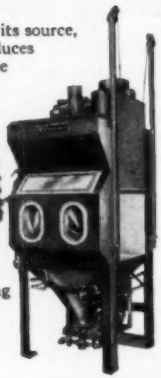
BLAST CLEANING!

Blast Cleaning Cabinet quickly and easily cleans rust, grime, dirt, paint, etc., from metal parts. Produces a clean, smooth surface on pieces up to 60" x 36". Models available from $319.00 and up.

Blast Cleaning Machine not only removes rust, dirt, scale, etc., but is ideal for maintenance and many other uses. Cleans large objects such as bridges, structural work, tanks before painting. Six sizes, portable or stationary, from $170.00 and up.

DUST COLLECTING!

Unit Dust Collector stops dust at its source, minimizes machine wear and tear, reduces housekeeping and general maintenance costs. Solves many grinding and polishing nuisances. Reduces material losses. Models from $286.00 and up.



PRECISION FINISHING!

Hydro-Finish Cabinet uses liquid blast, eliminating dust, and reduces costly hand polishing, cleaning and finishing of molds, dies, tools, etc. Removes scale, discoloration and directional grinding lines, prepares surfaces for plating and coating. Holds tolerances to .0001". Models from $1410.00 and up.

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- ☐ Blast Cleaning Machines
- ☐ Unit Dust Collectors
- ☐ Hydro-Finish Cabinets

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Gentlemen: Please send me more information on the equipment I've checked at the left.

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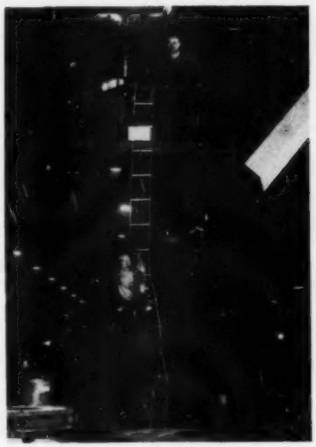
PLANT ENGINEERS' DIGEST

(Digest begins on page 26)

In emergency, the operator pulls the bottom rung from the box and throws it over the side of the cab. The ladder's own weight pulls it to the floor. The operator then lowers himself down sideways on the ladder.

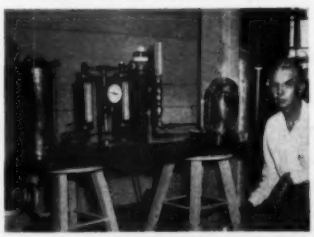


Worker demonstrates how the red rung ladder can be used for emergency escape

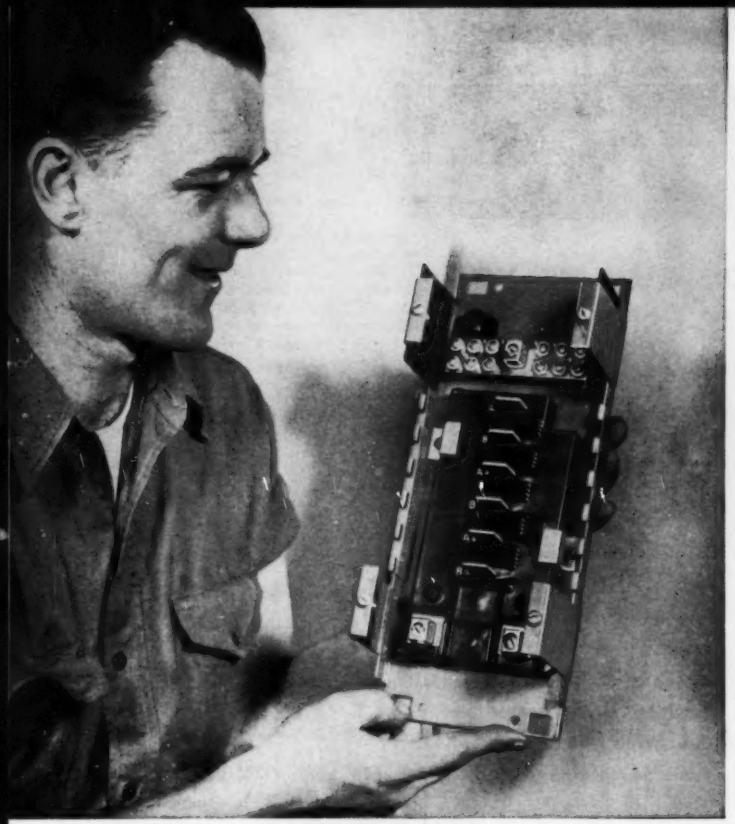
If a fire should start in the crane cab or on the foundry floor under it, it's possible that the crane could not be moved. This ladder might be the crane operator's only means of escape from fire or intense heat. *From The Falk Reflector, published by The Falk Corp., Milwaukee, Wis.*

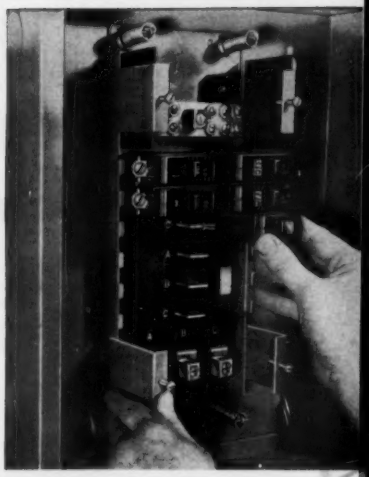
System Detects Odors in Water

THE WATERWORKS manager of Harlingen, Texas, read about a new method of evaluating water odors that the chief chemist of the City of Chicago, Ill., developed. He decided to have a similar one built in the Harlingen shop. The resulting equipment provided a quick and easy method of determining the



This is the apparatus that was assembled for use at the Harlingen Works





QUICK-MAKE, QUICK-BREAK PLUG-IN BREAKER—Trumbull's new NLTQ Panelboard introduces the first *plug-in* circuit breaker with quick-make, quick-break operation. Other features: both *thermal* and *magnetic* protection . . . trip-free . . . pressure-type silver-plated copper plug-in contacts . . . all ratings physically interchangeable. Adjacent breakers are on alternate phases—assuring balanced loads and circuits.

New insulating material

KEEPS PANELBOARDS COOLER

The base of this panelboard interior is made of *Plastisol* . . . the first time this amazing plastic material has been used for this purpose.

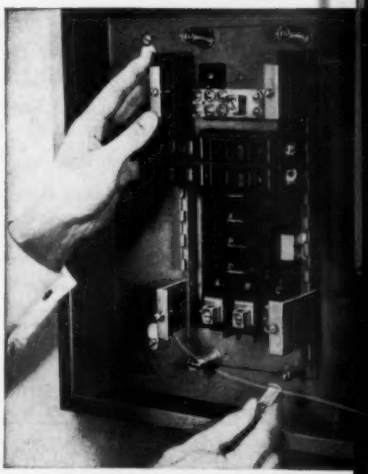
Here are some of the properties which make Trumbull's new NLTQ Panelboard a superior product which will give you excellent service.

Plastisol has very high thermal conductivity and is an excellent radiator of heat. Copper bus bars encased in Plastisol run 10% cooler than in open air!

SUPERIOR TO ALL OTHER TYPES OF INSULATION

Other Plastisol advantages making it superior to all other types of insulation for this purpose include its ability to resist acid and alkali, high temperatures (not harmed at 212 F), tracking and carbonizing. It will not shrink or become brittle, even at minus 30 F.

Trumbull's Plastisol base is Underwriters' Laboratories, Inc. approved and endorsed by the Electrical Council.



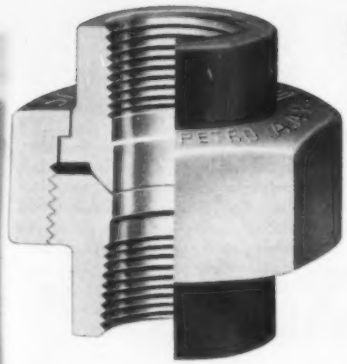
QUICK INSTALLATION—NO NUTS AND WASHERS—Interior is mounted in box by compression springs . . . which permit easy release for removal. Springs also permit lining up fronts regardless of uneven box installation. Trumbull NLTQ panelboards with lug or circuit breaker mains come in capacities up to 225 amperes in a range of 4 to 42 circuits. Write for Bulletin TEB-14.

TRUMBULL (T) ELECTRIC

DEPARTMENT OF GENERAL ELECTRIC COMPANY
PLAINVILLE, CONN.

IT'S MAGICAL

THE SUPERIOR QUALITY YOU GET FOR SUCH A LOW PRICE IN PETRO AND MARK A.A.R. FORGED STEEL UNIONS

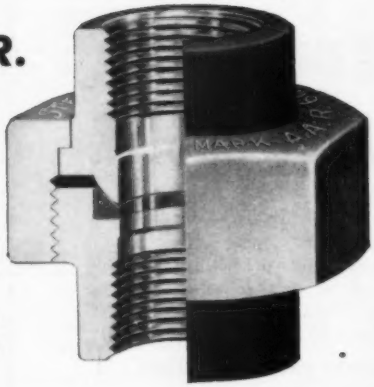


PETRO A.A.R.
REG. U. S. PAT. OFF.

Exclusive features in Petro unions: Permanently lubricated nut threads, cold rolled female seat, a differential of 40 points (Brinell) hardness is maintained between the male and female seats to safeguard against galling of seats.

MARK A.A.R.
REG. U. S. PAT. OFF.

Exclusive features in Mark A.A.R. unions: Permanently lubricated nut threads; the bronze seat is fused to the steel, then machined and cold rolled. The heaviest and strongest steel union, rated at 2000 lbs. C.W.P.



Write Department P for new illustrated catalog or refer to listings in Chemical Engineering Catalog pages 1120-1121, Composite Catalog pages 3140-3141 and Refinery Catalog page 653.

ORDER BY TRADE NAME FROM YOUR LOCAL SUPPLY STORE

ORIGINATORS AND PIONEERS OF STEEL UNIONS SINCE 1912

CLAYTON MARK & COMPANY

1900 DEMPSTER STREET • EVANSTON, ILLINOIS

PLANT ENGINEERS' DIGEST

(Digest begins on page 26)

threshold odor number of water, at a material cost of $115.75.

This system is completely self-contained and portable, consisting of a carbon filter to produce the odor-free water; two or more flow rate meters to measure and regulate flow of the odor-bearing sample and one or more meters to measure the odor-free water. This provides a uniform method of measuring the flows as they are mixed under 15 lb pressure and released through a spray nozzle inside the glass bell jar, where testing for odor is made.

The apparatus shown in the illustration will calculate odor number to 22 only. It will test samples of raw river water, settled water, filtered water and tap water. In Harlingen, it has been found very useful as an aid in keeping down all phenol or excessive chlorinous odors that often develop, even during the time of the year when no algae or micro-organism growths are prevalent in water. *From The Rockwell Water Journal, published by the Rockwell Mfg. Co., Pittsburgh, Pa.*

Wheels Cover Plant Distances

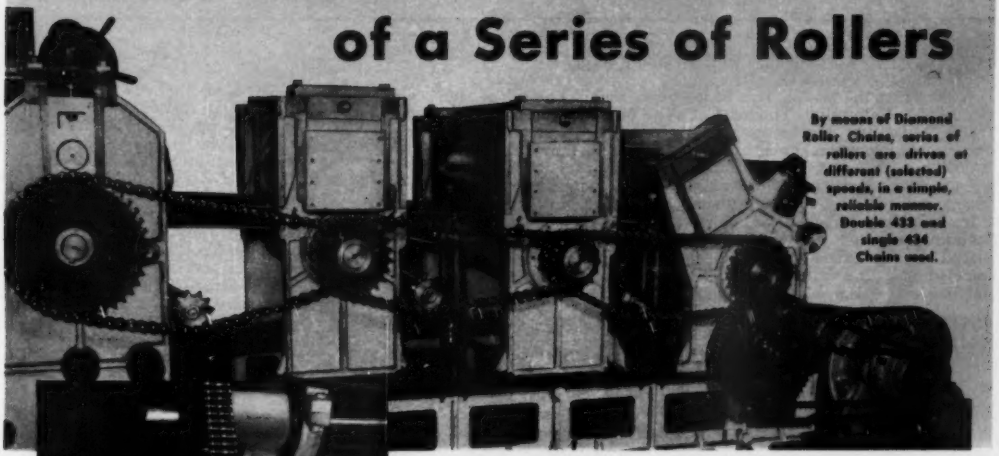
HANNIBAL had his elephants; the Bluebonnet plant of the Corn Products Refining Co. has its bicycles. Because of the distances separating

Plant executive sits astride an iron steed which takes him places quickly

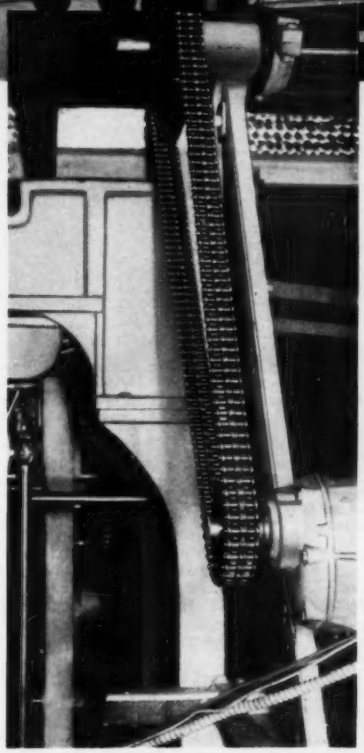
the various buildings, most of the inter-building traveling is done on two-wheelers.

It is estimated that the time spent en route from one place to another has been cut in half since the trusty rubber tired steeds were put into use. *From Yours Truly, published by the Corn Products Refining Co., Chicago, Ill.*

SIMPLIFIED DRIVING »
of a Series of Rollers



By means of Diamond Roller Chains, series of rollers are driven at different (selected) speeds, in a simple, reliable manner. Double 433 and single 434 Chains used.



On the Clermont Sheet Former Matzo Machine, the power transfer medium is Diamond double 433 Chain.

Engineered With
DIAMOND
ROLLER CHAINS

• Practical machinery design engineers make wide use of DIAMOND Roller Chains to accomplish results not easily done otherwise. As an example, note the driving of several stages of rollers on the Clermont Machine Co. Matzo Dough Roller.

By use of Diamond Chains, the engineers simplified the design, kept weight to a minimum, and provided the exact, though different speed ratios for the several stages, and insured long-life, trouble-free operation.

For peace-time competition and defense preparedness production, you can rely on the dependability of power transfer that *Diamond* Roller Chains provide.

DIAMOND CHAIN COMPANY, Inc.
Dept. 614, 402 Kentucky Avenue, Indianapolis 7, Indiana

Offices and Distributors in All Principal Cities

Refer to the classified section of your local telephone directory under the heading CHAINS or CHAINS-ROLLER

MAINTENANCE & OPERATION of buildings, utilities and facilities

Edited by H. E. B. Anderson

Longer Life for Tote Boxes After Reconditioning

To INCREASE the usable lives of its tote boxes, Caterpillar Tractor Co., Peoria, Ill., has a reconditioning program in operation. Each of their 187,000 tote boxes will go through the program, consisting of cleaning, rinsing and painting, every 2½ years.

In removing chipped paint and accumulated rust the boxes are placed in an airless blast cabinet for cleaning. The front of the cabinet has two doors, either of which can completely close the cabinet. A 66 in. rotating work table is mounted on each door. As a door is closed, the table moves into the blasting zone.

The company has placed a fixture on each table for holding the boxes so that all surfaces are completely covered by the abrasive thrown from two rotating wheels. Each box is blasted in two positions, with a one minute time cycle in each position.

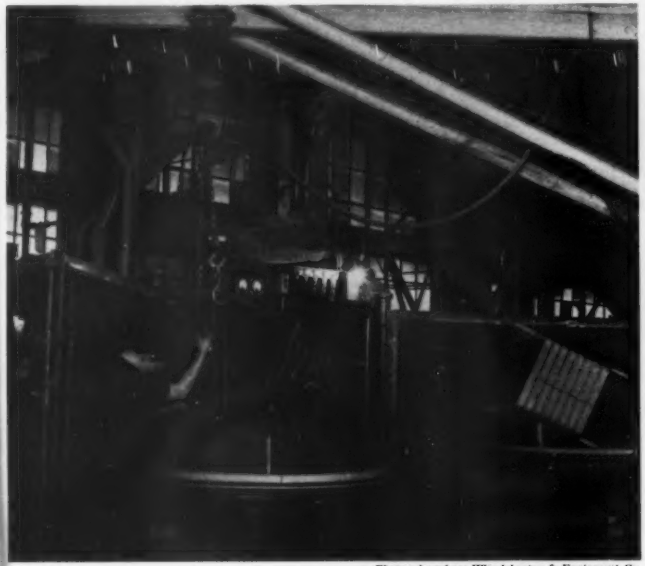


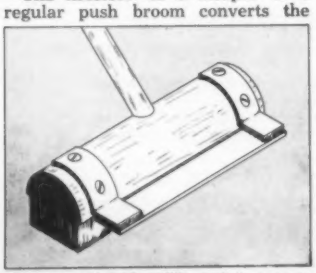
Photo: American Wheelabrator & Equipment Co.

Tote box at left is being placed on work table, box at right has been cleaned

Add Scraper—Increase Efficiency

Contributed by F. E. Riley

THE ADDITION of a scraper to a regular push broom converts the broom into a more complete cleaning tool. The scraper is made from 3/16 in. steel strip, about 1½ in. wide. Mounting brackets are made from the same strip and are welded to the scraper. The unit is then screwed to the broom head. With the scraper in position, a quick flip of the broom puts the edge of the scraper into play against any metal chips or bulky materials that the broom bristles will not move.



Broom equipped with metal scraper does double duty when cleaning floors

Quick Check Spots Moisture

IN THE MANUFACTURE of coated abrasives, inadequate control of moisture frequently leads to poor quality, non-uniform flexing, losses due to mold and paper delamination from excessive moisture, and bond failure caused by insufficient moisture.

The Carborundum Co., Niagara Falls, uses a portable moisture meter that indicates per cent moisture directly, when its needle electrodes are pressed into the sheet being tested. The meter permits accurate on-the-spot measurement of moisture in coated products at all stages of production throughout the plant.

A meter is used in initial coating operations as an aid in observing drying conditions, and to insure proper moisture content in the coated material as it leaves the drying room. Meters are also used in auxiliary drying and curing stages to help prevent dehydration of backings and coatings which require an equilibrium moisture content. Meters are again used to check the moisture content of the materials prior to final processing.

Photo: Weston Electric Instrument Corp.

Operator uses portable meter to check moisture content of coated abrasive

According to Carborundum, the meters have enabled them to maintain product uniformity, and their portability makes them useful in the numerous company processes. Quality has improved, with decreased losses due to improper moisture in their products.

Lacing Leather Drive Belts

Contributed by Paul C. Ziemke

The lacing of leather drive belts is still widely done in the power transmission field, in spite of the various types of belt hooks and splicing plates now employed.

Two methods of lacing a belt are presented here as a guide to a long-lasting, trouble-free laced joint. In both instances, rawhide lacing, soaked to make it pliable, is the preferred lacing. Burning the tips of the rawhide in a flame produces a hard, unyielding leader, for easy insertion

That's All the Cleaning an Allis-Chalmers TEFC Motor Ever Needs

MAINTENANCE COSTS ARE LOW for users of Allis-Chalmers Totally-Enclosed, Fan-Cooled Motors. They are easy to clean because even the stickiest dirt can be wiped or blown off without dismantling the motor or even stopping it. They seldom require cleaning because cooling air flows over the *outside* of the motor. There are no external concealed air passages to clog up and cause over-heating. You get better operational continuity, lower maintenance.

Bearings Save Maintenance, Too

Double-shielded ball bearings require no regular maintenance under most normal operating conditions. Yet if difficult service makes re-lubrication desirable, it can be done without dismantling the motor or bearings. Rigid cast iron frame and stiff end brackets maintain bearing alignment . . . assure maximum bearing life.

A-3639

Texrope and *Vari-Pitch* are Allis-Chalmers Trademarks.

Get The Full Story Now

Your Allis-Chalmers Authorized Dealer or District Office can give you complete information on Allis-Chalmers Totally-Enclosed, Fan-Cooled Motors and how they can save you money. Call one of them today or write Allis-Chalmers, Milwaukee 1, Wisconsin. Ask for Bulletin 51B7225.

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CONTROL — Manual, magnetic and combination starters; push button stations and components for complete control systems.

TEXROPE — Belts in all sizes and sections, standard and *Vari-Pitch* sheaves, speed changers.

PUMPS — Integral motor and coupled types from ¾ in. to 72 in. discharge and up.

ALLIS-CHALMERS

MAINTENANCE & OPERATION

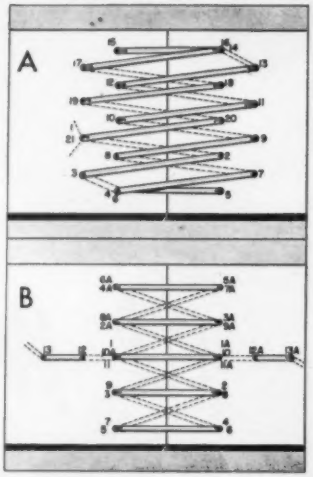
(M & O begins on page 48)

of the lace into the holes in the belting. These holes should be cut with a sharp oval punch, on a definite marked pattern, to provide the maximum strength in the belt joint. Good practice dictates that the lacing be pulled tight as the work progresses with no slack left to be removed after the lacing is completed. A perforated belt awl is an invaluable tool in the lacing operation, both as an aid in threading and pulling the lacing, and for enlarging the holes if necessary during the lacing.

In the first of the two methods, two rows of holes are laid out on each end of the belt. The outer hole in the row should be ¾ in. from the edge of the belt, and the rows spaced at ⅞ in. and 1¾ in. from the belt end. The lacing is begun at the hole marked 1, and continued through the holes as numbered.

The second method employs a single row of holes in each end of the belt. This arrangement has the advantage of the completed lacing lying parallel with the belt motion, on the pulley side of the belt. The lacing is doubled, to locate its center, and the two ends passed through the two holes marked 1 and 1a. Each end is then passed through its numerical series of holes, much the same as lacing a shoe. The lacing is finished at holes 13 and 13a, which are additional holes for fastening the ends of the lace.

Both splices should be flattened when completed, by hammering with a mallet. The drying of the rawhide lace will shrink the joint sufficiently to produce a tight, smooth-running endless belt.



Lacing diagrams for belting illustrate the two methods of making splices

Steps Rebuilt—Safety Installed

COILS OF WROUGHT IRON PIPE laid beneath treads and landings of a building approach provide for circulation of hot water and antifreeze to keep the approach free of ice and snow.

The flagstone treads and risers, which had been laid over the original concrete, were removed and the concrete scored to admit lengths of ¾ in. pipe. The pipes were laid in the grooves over a layer of waterproofing mastic, and then covered with a layer of mortar. Replacement of the flagstone treads and risers restored the approach to its original arrangement, with safety built in.

Photo: A. M. Byers Co.

Pipe coil layout prior to mortar pour. Area of flagstone removal is mastic-coated as a waterproofing preparation

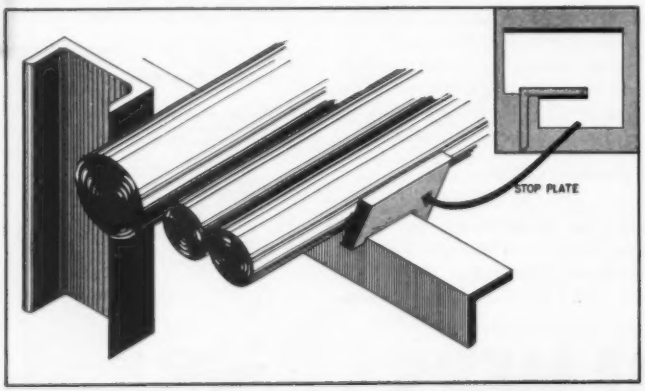
Movable Stop Plate Holds Round Stock on Storage Rack

Contributed by F. E. Riley

THE CONSTRUCTION of bar stock or pipe racks from welded structural steel shapes is often done with vertical members of channel and angle iron horizontal members. Shop-built racks of this type require a means of preventing the round shapes from rolling off the rack arms.

One successful answer to this requirement was found in the use of U-shaped stops, cut from ½ in. steel plate. Slipped over the ends of the rack, these stop plates tilt over and grip the angle iron when a piece of stock rolls against them. The design of the stops is such that the more pressure exerted against them by the stored stock the more positive their grip on the angle iron. By merely pushing the bar stock back onto the rack, however, the pressure against the stop is relieved. The stop is then easily released and moved to any position desired.

Use of two of the stops on one arm of the storage rack facilitates the isolation of one bar at a time, and the removable feature of the stops permits the single bar to be slid out of the rack, without lifting.



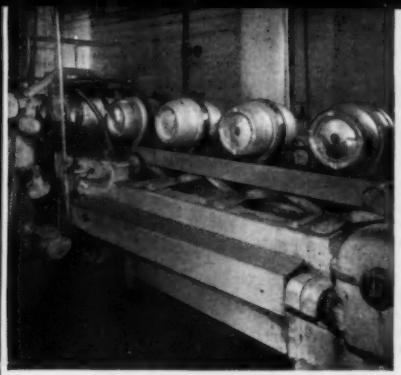
Stop plate (inset) grips the angle iron rack member to hold round stock in place

What to Do— About Pulsation in Blowers

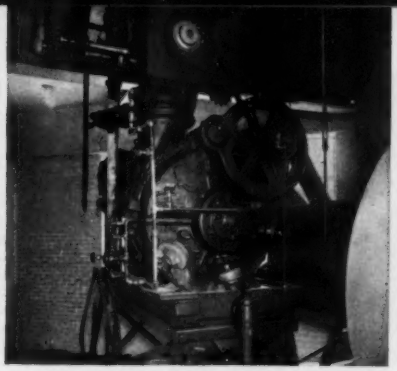
A CENTRIFUGAL blower, used in the capacity range for which it was designed, seldom presents a problem of pulsation. However, blower applications which require the blower running during periods of small demand (sometimes as low as 10 or 20 per cent of rated output) tend to surge. A resultant pulsation may be set up which will disturb the process and cause overheating.

Such pulsations can be prevented and corrected if the mechanics of pulsation and centrifugal blower characteristics are understood. To promote this understanding, O. W. Acheson, of the Billmyre Division, Lamson Corp., Syracuse, N. Y., outlines the major factors governing blower applications.

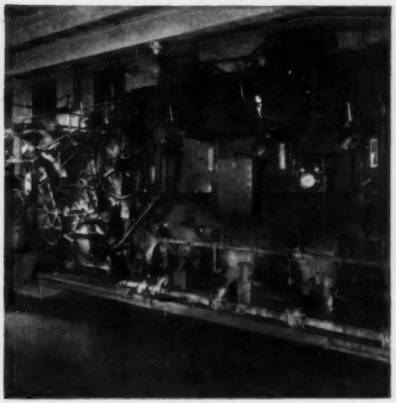
If the volume demand on a blower



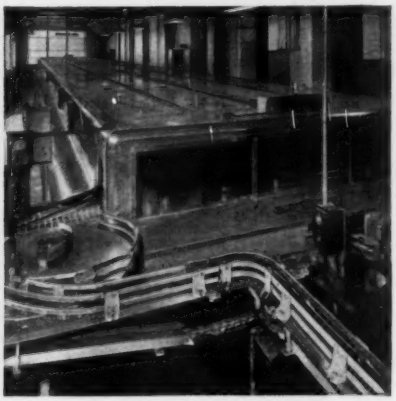
Keg scrubber—A constant stream of water at 130°F. plays over these barrels and reaches bearings on conveyor.



Wet-grain press—After being heated to 180°F., grain is then pressed dry. Hot water comes in contact with bearings.



Bottle soaker and washer—Bottles are first cleaned with strong alkali at 180°F., then washed with water. These conditions make bearing lubrication difficult.



Pasteurizer—Beer is pasteurized in this modern machine which is subjected to constant water spray ranging from 80°F. to 140°F.

No trouble brewing for bearings!

A midwest brewing plant employed seven different greases in a variety of applications. Despite the use of these special products, the operators experienced difficulty. The greases would not withstand both water and high temperatures. Frequent applications were necessary.

A Standard Oil lubrication specialist was called in on this problem. Upon his recommendation, STANOLITH Grease—a lithium-soap product with the ability to withstand both heat and water—was given the job.

As a result, STANOLITH has replaced all seven greases formerly used and *has done a better job in each type of application.* Through its use over a two-year period, grease consumption has been reduced 20% and time spent in applying grease cut 50%.

STANOLITH Grease can prove its remarkable versatility in your plant, too. Its high mechanical and chemical stability plus its extreme resistance to heat and water qualifies it to replace a variety of special greases.

STANOLITH
TRADE MARK
Greases

To obtain maximum benefits from STANOLITH, use the services of a Standard Oil lubrication specialist. His headquarters are near your plant. How you can benefit by his on-the-spot service is explained at the right. Standard Oil Company, 910 South Michigan, Chicago 80, Illinois.

What's YOUR problem?

Mr. D. V. Wills of Standard Oil's South Bend office is the lubrication specialist who helped this Midwest brewing company solve a difficult lubrication problem.

He is one of many Standard Oil specialists located throughout the Midwest. These men have the practical experience and special training to handle lubrication problems on any type of operation.

Take advantage of the service offered by the lubrication specialist nearest your plant. You can reach him by phoning your local Standard Oil Company (Indiana) office. Why not call, today, and arrange to discuss with him the advantages offered you by STANOLITH and other outstanding products such as:

STANOIL Industrial Oils—This general-purpose line of oils provides cleaner operation of hydraulic units and supplies effective lubrication in compressors, gear cases, and circulating systems. One or two grades can replace a wide variety of specials oils and lubricants.

SUPERLA Greases—Available in a wide range of consistency grades and in both lime-soap and soda-soap types, SUPERLA Greases cover a wide range of applications. These efficient products are comparable in quality with the highest type of special greases.

STANORUST Rust Preventives—The eight grades of STANORUSTS form one of the most complete and effective lines of rust preventives on the market today. Each has been scientifically developed for its intended use. The grades range from a fingerprint remover to a heavy petrolatum that protects against corrosion for years under the most severe outdoor exposure.

STANDARD OIL COMPANY

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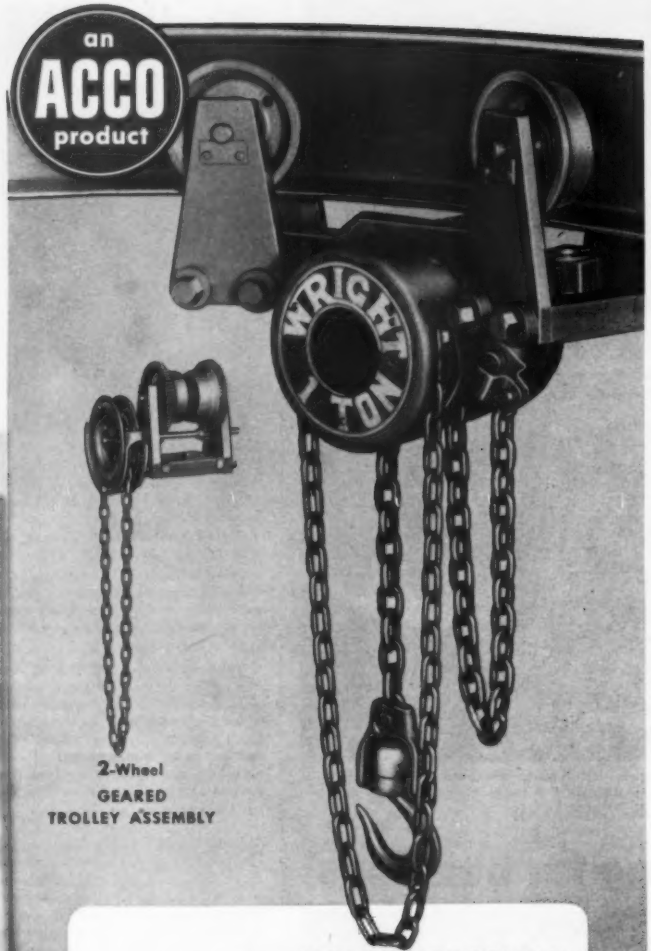

2-Wheel
GEARED
TROLLEY ASSEMBLY

Army Type **WRIGHT SAFEWAY**

• A steel hand hoist with compact, adjustable suspension and trolley to fit various width I-beams. Designed for low overhead. Easily converted to 2-wheel geared trolley unit.

Longer-life features include: steel in all load-supporting parts; load sheaves with five formed pockets; automatic load chain lubricator; alloy steel load chain; swiveling drop-forged load hook; alloy steel, machine-cut gears; fully enclosed, self-oiling gear case.

See your WRIGHT distributor or write for Bulletin **DH-269.**

ACCO

WRIGHT HOIST DIVISION
AMERICAN CHAIN & CABLE

York, Pa., Chicago, Denver, Detroit, Los Angeles, New York, Philadelphia, Pittsburgh, Portland, San Francisco, Bridgeport, Conn.

TRADE MARK

WRIGHT
Hoists
Trolleys
Cranes

MAINTENANCE & OPERATION

(M & O begins on page 48)

is decreased, within normal operating ranges, maintaining favorable pressure-volume ratio, the pressure at the blower rises normally as the change is completed. But if the volume requirement is decreased to a very low point, below the maximum pressure-volume point, the resulting pressure changes may cause surging.

The blower delivery pressure first decreases at the blower itself. Momentarily, the pressure in the piping system connected to the blower is greater than that at the blower and the air tends to reverse its direction and flow back into the blower, until pressure equalizes. When the equalization is achieved, the blower resumes normal operation, until the volume throughout is again decreased considerably, and the sequence is repeated. The continued pressure reduction and equalization constitutes surging, with its frequency depending upon the slope of the volume-pressure curve, the rate of removal of air from the system, and the volume of the piping system connected to the blower.

Primarily, prevention of pulsation can result only from anticipation, at the design stage, of its causes; if the blower will be subject to frequent volume cuts, include this fact in the blower specifications, to assist the manufacturer in selecting the correct blower.

Several possible "cures" can be effected, should surging be detected in an installed blower system: 1. The blower may be replaced with a smaller capacity unit (this may or may not be economical). 2. An additional small capacity unit may be purchased for use only during low demand periods. 3. Bleeding air out of the system continually will tend to keep the blower delivery volume above the critical surge point. 4. Infrequent or short-duration surging can often be absorbed effectively by the system, if surging at the usage point is eliminated by the installation of a surge tank, to even out the flow at the exit. 5. Minor design changes to permit by-passing air at the blower, and sacrificing either blower efficiency or system tightness may also eliminate the pulsation.

Portable Ram Drives Die Keys

A PNEUMATIC RAM, mounted on an iron skid and carried on the forks of an electric lift truck, provides portable power to drive forge die keys into place. The key driving operation is safer, easier and faster than the formerly used system, which employed an overhead crane to support a 6 ft steel ram, with several men to guide the ram as the

crane operator swung it against the forge key.

The portable ram unit is moved up to the forge and positioned both vertically and horizontally by the

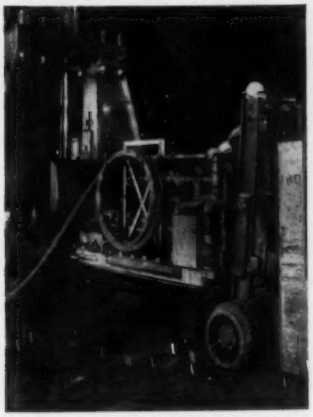

Photo: Baker Industrial Truck Div.

Lift truck in position for driver to operate the ram that drives die key

truck driver. A compressed air hose, carried with the ram, is coupled to an outlet convenient to the forge. The fork truck driver pulls a lever, and the forge die key is driven by the ram with a minimum of effort and manpower.

Plastic Pipe Becomes Light, Non-Corrosive Well Casing

Photo: Yardley Plastics Company

Winch lowers one length of 6 in. plastic pipe into 475 ft well. Pipe returns warm water underground for cooling prior to pickup by supply pump in adjacent well

Inert Arc Welder Saves Fabrication Time and Cost

FABRICATION of power-recovery turbines for aircraft engines has been accelerated by the use of an internally water-cooled inert arc welding torch. Engineers at the McGregor Manufacturing Corp., Birmingham, Mich., report that use of the

an
ACCO
product
featuring
DUALOC*
BIG . . . or small
● It makes no difference if your load is big or small, light or heavy, rough or smooth. There is an ACCO Registered Wire Rope Sling for the job.
You can get standard Strand-Laid and Cable-Laid Slings from local distributors. Many others are carried in factory stock. The big ones and very special ones we design and make specially for you.
Every ACCO Registered Wire Rope Sling is proof-tested, identified with a metal tag, and warranted as to rated capacity. We eliminate the guesswork. See your distributor today or write for information.
*Trade Mark Registered
ACCO
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Wilkes-Barre, Pa., Chicago, Denver, Houston, Los Angeles, New York, Odessa, Tex., Philadelphia, Pittsburgh, San Francisco, Bridgeport, Conn.
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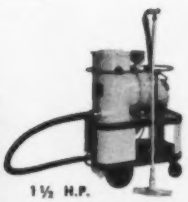
WHY GOOD *Plant Sanitation* COSTS LESS WITH SPENCER VACUUM

It is a fact that large or congested industrial areas can be Spencer Vacuum cleaned better and faster, at less cost, than by hand or with inadequate power. And with Spencer, the dirt container has ample capacity and is easily removed and rolled on casters to the point of disposal. In addition, special Spencer Vacuum tools take care of overhead pipes, walls, machinery and even the boiler tubes and hot materials which can be removed before they cool off.

AN EXTRA DIVIDEND. But the big saving comes when you apply Spencer Vacuum to the production line. For instance, you can recover valuable metal chips by the ton, convey loose materials by the carload, remove welding and other toxic fumes at their source and speed up bench and assembly work in every department.

There are at least 132 Essential and Unusual Uses for Spencer Vacuum in Industry—all described in Bulletin No. 144—yours for the asking.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THE SPENCER TURBINE COMPANY • HARTFORD 6, CONNECTICUT

SPENCER HARTFORD

MAINTENANCE & OPERATION

(M & O begins on page 48)

torch has saved at least 25 per cent in gas requirements over previous equipment used. Downtime for adjustment of the tungsten electrodes was reduced, and consumption of the

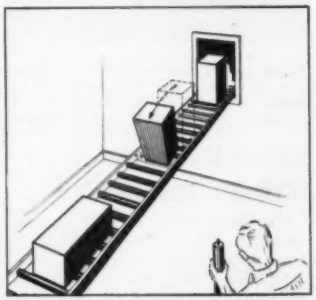
Photo: General Electric Co.
Welder using internally water-cooled torch fabricates aircraft turbine part

tungsten was curtailed due to the more efficient gas nozzle design. The internal water cooling system has also contributed to the reduced tungsten consumption, while providing a more stable arc in the welding of an Inconel part to a cast stainless steel base.

Carton "Trip" on a Conveyor

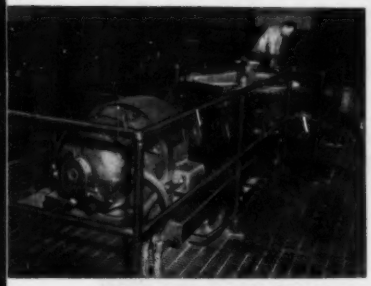
Contributed by S. Marlowe

THE REMOVAL of a single roller from a roller conveyor (or a set of wheels from a skate wheel conveyor) provides a means of easily flipping a carton over on its side, from a vertical position. The carton,

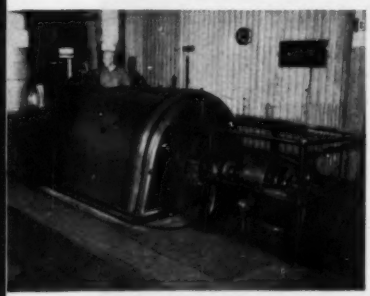


Roller removed from conveyor leaves space that "trips" carton, turns it over

Servicing of standby pump motor is checked by Paul Tuttle (2nd from left), of G.E.'s Cleveland Apparatus Service Shop.



Standby motor for this circulator motor on 4-story-high vacuum pan is always ready to protect its nonstop 10-day cycle.



Renewal parts for main turbine-generator are ordered in advance for its annual overhaul, when 3 standby units take over.

Management recognizes maintenance as a vital factor in obtaining higher production at the Colonial Salt plant in Akron. E. Edminister (left), maintenance supervisor, is ranked at same level as two production supervisors, all three reporting directly to George Martin (right), superintendent of plant operations.

Get more management recognition with *Productive Maintenance*

New G-E program helps maintenance men prove it can increase output

The Colonial Salt Division of General Foods has long known the importance of maintenance in raising output. As a result, in its Akron plant, maintenance ranks on a par with production. Now, to help you sell *your* management the same point of view, General Electric offers a new *Productive* Maintenance program that emphasizes planned equipment overhauls to minimize breakdowns. With a helpful "kit of tools," you can prove to your management that *Productive* Maintenance can increase output in *your* plant. Ask your G-E Apparatus Service Shop representative for full details, and write for your free kit to *General Electric Company, Section 801-6, Schenectady 5, N. Y.*

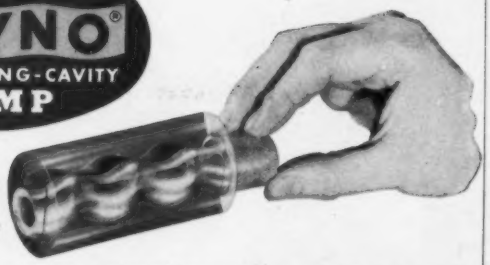
An adequate supply of needed renewal parts for emergency is kept in plant's stockroom and replenished whenever necessary.

Motor-record cards—part of plant's equipment-record system—help keep track of these reconditioned motors, ready to replace others on a scheduled maintenance basis.

New G-E "Kit of Tools" helps win management support. Write to *General Electric Company, Section 801-6, Schenectady 5, N. Y.*

GENERAL ELECTRIC

R & M
MOYNO®
PROGRESSING-CAVITY
PUMP



No Pistons!
No Valves!
No Churning or Pulsation!

Won't Cavitate!

Moyno "progressing-cavity" pumping, with its *positive displacement and pressure*, delivers constant, uniform, steady flow on every type of service. What's more, it resists abrasives and chemicals —handles everything from liquids to pastes—keeps going on the tough jobs where *other* pumps have failed.

WORLD'S SIMPLEST

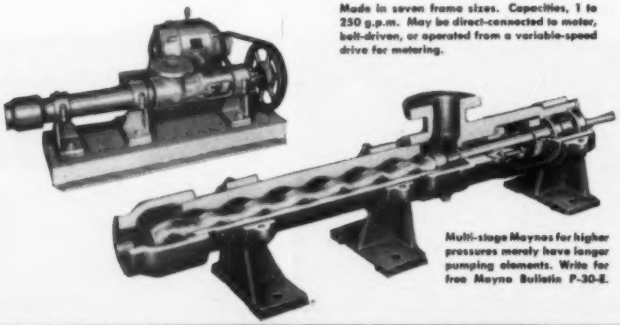
Here's the world's simplest pumping principle, and also the world's most versatile—a helical rotor rolling around within a double-helical stator. This forms "progressing cavities" (between continuous seal lines) which move materials *without agitation* at pressures to 1000 p.s.i.

Moynos pump virtually anything—plaster, potato salad, gasoline, glue, hamburger, milk, tooth paste, citrus juices, liquefied gases, pottery clay . . . even *diamond dust in oil*. They self-prime, pass particles and solids in suspension, cut pumping costs and maintenance problems on job after job.

SEE FOR YOURSELF

We'll be glad to tell you what Moynos are doing on work that's just like yours, for among the thousands already in use you'll find the same or similar service. Or, if your material is "different," we'll lab-test and *guarantee* output. Get all the facts on Moynos today.

Made in seven frame sizes. Capacities, 1 to 250 g.p.m. May be direct-connected to motor, belt-driven, or operated from a variable-speed drive for metering.



Multi-stage Moynos for higher pressures merely have longer pumping elements. Write for free Moyno Bulletin P-30-E.

ROBBINS & MYERS • INC.
SPRINGFIELD 99, OHIO • BRANTFORD, ONTARIO
MOTORS • HOISTS • CRANES • FANS • MOYNO PUMPS

MAINTENANCE & OPERATION

(M & O begins on page 48)

moving down the conveyor, flips over when the leading edge of the bottom drops into the space in the conveyor.

The change of position can be accomplished by the conveyor with no injury to the carton. For frequent but temporary use, the conveyor frame can be slotted to permit rapid removal and replacement of the roller, as required.

Built-In Storeroom For Portable Steam Jenny

Contributed by John Rehm, Allis-Chalmers Manufacturing Co.

Permanent rack installed on front of a portable steam jenny facilitates carrying necessary materials. Compartments promote better housekeeping and insure availability of equipment at job-site

Gin-Pole Rigging for a Big Lift

Contributed by H. B. McDermid

GIN-POLE RIGGING is far from a lost art, as was demonstrated in the installation of a 60 ft span, 60 ton capacity crane on existing rails in an erection shop.

To expedite the installation, the completely assembled crane, with its trolley, was to be lifted into place in one hoist, rather than raising each piece into place for assembly on the crane rails, a much more difficult task.

A gin pole long enough to extend above the roof supports was chosen, to facilitate anchoring the top of the pole in the roof girders. The anchoring was done to an extreme, with four heavily tackled triple blocks secured to the top of the pole, and drawn up tight to the roof girders. This rigging made it almost impossible for the top of the pole to move. The bottom of the pole was set on a platform made of blocking, designed to spread the weight of the lift over as great a floor area as possible.

To do the hoisting, four electric winches were used, one on each of

LEONARD CARPENTER OF CURTIS HOTEL SUBMITS WINNING IDEA

Leonard Carpenter, chief engineer of the Curtis Hotel in Minneapolis, tells us how he has set up a remote control for a steam valve located far from the boiler room. This labor-saving innovation won Mr. Carpenter an award in the Honeywell Industrial Control Idea Derby.

The problem was one of cutting down travel. In the basement of the hotel is the boiler room where exhaust steam from the heating system is used to generate power for the building. Twelve stories up, on top of the roof, is the pressure valve for the heating mains. Every time the steam mains needed a change of pressure, a man had to go all the way from the boiler room to the roof, to adjust weights on the butterfly valve. Often these changes had to be made several times a day.

Carpenter worked out an efficient solution. He installed a Honeywell *Modutrol* motor on the valve up on the roof. Then he connected the motor to a Honeywell *Pressuretrol* located in the boiler room. Now, he can get any pressure he wants simply by setting the *Pressuretrol*. Nobody has to leave the boiler room to set the valve. Adjustments are made instantly, without the time lag of twelve-story trips.

Honeywell *Pressuretrol* Unit

NEW NEWSPAPER HELPS PLANT ENGINEERS

Honeywell's Industrial Division now issues a periodic publication—*Industrial Control News*—which contains detailed information on many new and unusual applications for automatic controls throughout industry. In its pages, production and maintenance men tell how they are reducing costs and increasing operating efficiency on all types of equipment. According to a release from the company, anyone interested in industrial controls can contribute to *Industrial Control News* . . . and can receive copies . . . by sending name, company, title and address to MINNEAPOLIS-HONEYWELL REGULATOR CO., *Industrial Division*, Station 40, 4491 Wayne Ave., Philadelphia 44, Pa.

do you have an "IDEA" for the

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IDEA DERBY?

Just send us a sketch and description of how a non-indicating control is now being used to help keep things running smoothly in your plant. Think about it! Then send it in! An impartial board of judges will rate it in terms of its importance to the maintenance of plant operations. You may win a Honeywell Electric Clock Thermostat or one of the other special awards. All material submitted becomes the property of MINNEAPOLIS-HONEYWELL REGULATOR CO., *Industrial Division*, 4491 Wayne Ave., Philadelphia 44, Pa.

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MINNEAPOLIS
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First in Controls

CAN BE EXPENSIVE!

● It's easy for shop personnel, working in the bedlam of the ordinary shop office, to make mistakes. Phone messages are difficult to hear, and ordinary conversation is often next to impossible. When communications break down, misunderstandings and mistakes begin—*and one mistake can be costly!*

It's easy to overcome this difficulty by erecting plant offices constructed of noise-deadening ISC "Soundmetal" panels. They're easy to erect, easy to move to another location, and flexible to fit available space. And they prevent jangled nerves, and needless and costly mistakes, by shutting out plant noise.

Machinery noise above certain levels can bring serious results—reduced worker efficiency—and output—permanently impaired hearing. The potential cost of claims for deafness caused by working conditions is a matter of grave concern to industry.

When profit depends on employee output, it's foolish to take chances with employee morale—and risk damage suits as well.

Write today for full information.

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Industrial Sound Control, Inc.

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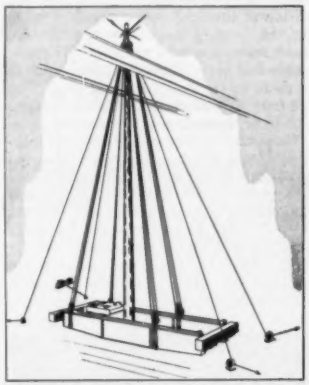
MAINTENANCE & OPERATION

(M & O begins on page 48)

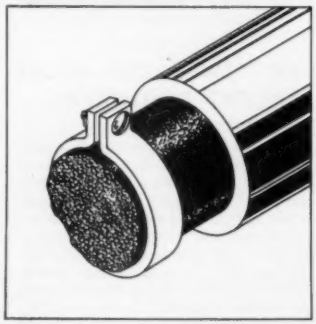
four triple blocks hung from the top of the gin pole to the lifting slings on the crane girders. Once the lifting tackle was in place, the trolley was located on the crane girders in the position where its weight balanced the assembly. With the balanced load thus achieved, the hoist



Sketch shows gin pole, pole-top rigging and lift slings in position to raise the crane onto the rails. Electric winches supplied power to the four lift blocks

was made with tag lines furnishing the only guide necessary. When the assembly was raised between and above the crane rails, it was turned into its proper position, and lowered into place on the rails. With the completion of the wiring and cable installation, the crane was ready to operate.

Guide Designed for "In-Place" Contact Filing



A guide for re-facing the ends of round carbon, copper, or brass contacts, made from a piece of steel strap, bent to shape and drilled, can be mounted directly on the contact and filing can be done with the contact right in place

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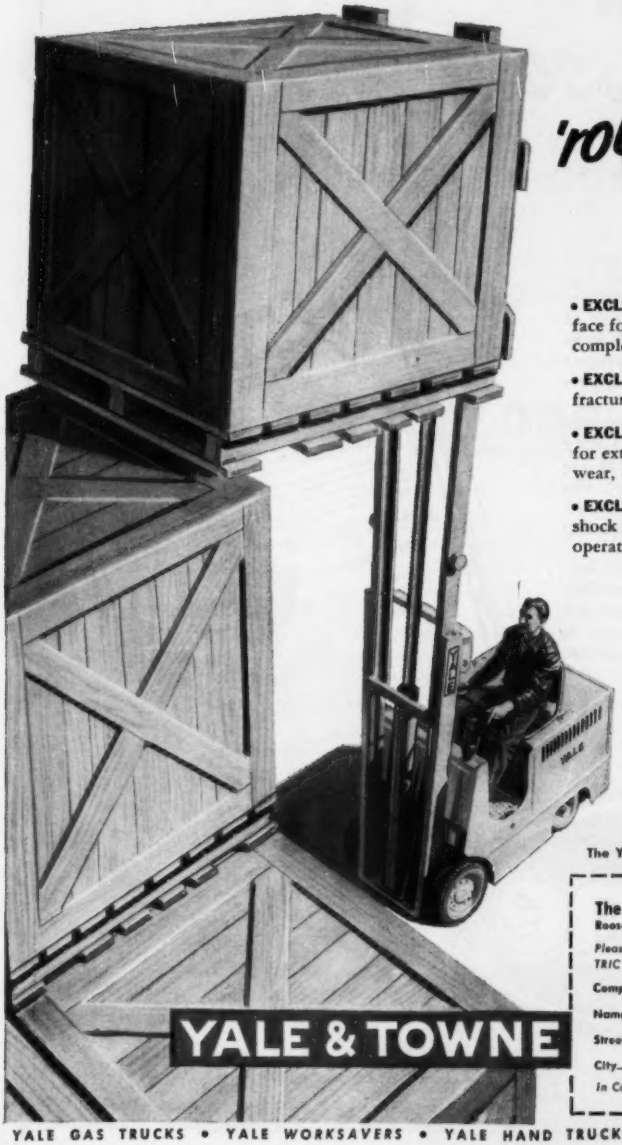
EXCLUSIVE FEATURES EQUIP YALE ELECTRIC TRUCKS FOR



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GET FULL-RATED GUARANTEED OUTPUT WITH WAYNE

When you buy a Wayne two-stage Air Compressor, you are *guaranteed* an actual usable air output to meet your individual job requirements not just a theoretical displacement rating. An exclusive flow meter test at the Wayne Plant makes certain every Wayne two-stage Compressor is checked for proper volumetric efficiency, and uninterrupted performance — *guaranteed* to the user.

Wayne Compressor construction features include such outstanding advantages as larger flywheel — more cooling capacity; dual intake valves; dual moisture extractors; improved lubrication system; automotive type pistons, and other refinements to give you top performance and long-lasting service.

Next time you buy a compressor, don't buy half a compressor, buy Wayne and get full-rated, *guaranteed* air output to meet your job requirements. Every Wayne Compressor is backed by a nation-wide service organization.

THE WAYNE PUMP COMPANY

SALISBURY, MARYLAND

Keep Power Flowing with RoZone-RoPrene® cable

Material shortages and tight controls are bad enough. When you add to them the "down time" cost of idle plant equipment, resulting from power failure, you've really got a "headache."

You can save yourself this kind of a "headache" by standardizing on RoZone-RoPrene for your plant power distribution system. How? Because you get *double protection* against failure. First, the insulation, RoZone, is a *premium* oil-base compound made for high quality and dependable performance. It has high dielectric and impulse strength. And, it's immune to the effects of aging, heat, sunlight and moisture. Further, where high voltages are involved, it is exceptionally resistant to the effects of corona and ozone cutting. Second, the tire-tough RoPrene (Neoprene) sheath has superior resistance to abrasion, oils, acids, alkalies, flame, moisture.

A rugged cable, RoZone-RoPrene is designed to keep power flowing even under the toughest conditions in paper mills, steel mills, chemical plants . . . any installation where dependability and long life are of utmost importance. It is available as single or multiple conductor for service ratings up to 8000 volts. It may be installed direct in earth, in conduits, aerially . . . or in circuits combining all three.

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SYSTEM PLANNING

This Westinghouse 1,000-kva Transformer, 4,160/440 volts, serves the refinery's Catalytic Cracker, right background.

Only sound system planning could provide reliability like this...

Reliable power was a must when Sohio decided to expand and electrify its Lima refinery. A seven million dollar Catalytic Cracker was at stake. If the blower motors stopped, the catalyst would fall and harden. Thousands of dollars would be lost.

Westinghouse engineers assisted in a carefully planned, economic study of the distribution system. This took full advantage of existing 4,160-volt primary feeders, and dictated use of a duplex system design. Spare transformers and switching capacity were made available —assuring the degree of reliability required.

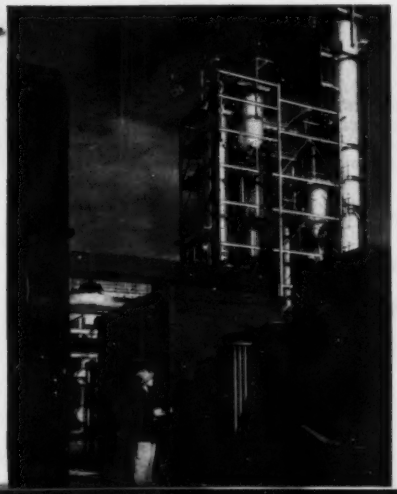
Westinghouse unitized equipment—factory assembled and tested—played an important part in the economics of the Lima system. It permitted high voltage to be brought nearer to the loads. It saved valuable building space because of the compactness of the metal-clad switchgear for the 3,000-horsepower blower motors and auxiliary drives.

Further, maintenance was greatly simplified due to easy accessibility of breakers and controls. Additional expansion can be easily accommodated.

CONSIDER THIS: It takes *sound planning* and *co-ordinated equipment* to provide modern distribution systems, capable of meeting your plant's power needs today and in the years ahead. Westinghouse offers you *both*—backed by years of experience, gained throughout all industry.

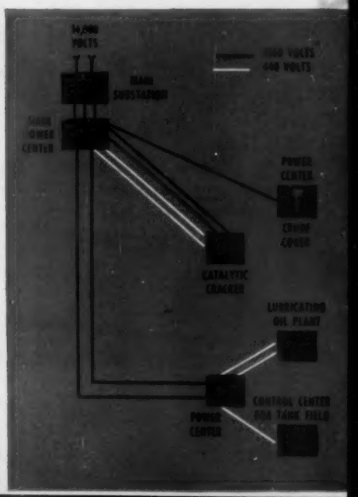
A call to your nearest Westinghouse office will bring an application engineer—well qualified to go over your distribution problems with you and your engineers. Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh 30, Pennsylvania. J-94950

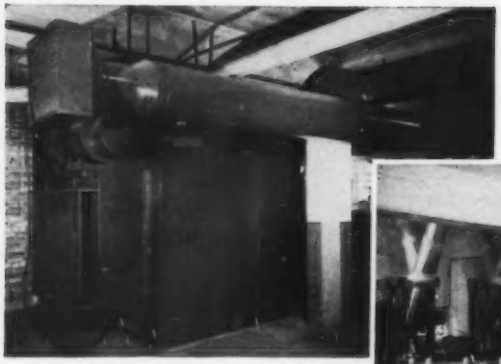
Westinghouse 440-volt Outdoor Power Center for the Lubricating Oil Plant contains two 1,000-kva transformers, 4,160/440 volts, and 440-volt Air-Breaker Switchgear.



Westinghouse 4,160 High-Voltage Switchgear, on the left, is located in the Main Switch House. It protects circuits for the entire refinery—a load of 14,000 kva.

Duplex system is served by the utility's 34-kv loop. It assures the reliability required for the 3,000-hp blower motors and auxiliary drives.





The Lectrodryer holds this filling room below 50% relative humidity, so the malted milk powder is kept DRY.

When you say,

"Make mine a Horlick's malted..."

Horlick's malted milk powder flows freely from the dispenser, because it was packaged in a DRY atmosphere. Regardless of outside weather conditions in Racine, Wisconsin—any day in the year—this filling room has "winter-weather DRYness". A Lectrodryer* keeps it that way.

Supply DRY air to processing equipment, workrooms and storage areas and you speed production, while also preserving product quality. That's the experience of thousands of plants all over the world, in dozens of industries. Lectrodryers do that DRYing.

The book, "Because Moisture Isn't Pink" describing many of these installations, may be your key to ways of increasing your production. For a free copy, write Pittsburgh Lectrodryer Corporation, 333 32nd Street, Pittsburgh 30, Pennsylvania. Ask for Bulletin 216.

In England: Birlec, Limited, Tyburn Road, Erdington, Birmingham.
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Of course! Tycol Armitage Bearing Grease "stays put" ... keeps anti-friction bearings running smooth and cool. Its high stability makes it suitable for sealed anti-friction bearings that must last the life of the equipment.

Tycol Armitage possesses exceptional resistance to oxidation.

The dependable lubricating ability of this quality grease lengthens bearing life and cuts down maintenance costs.

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FOR LUBRICATING OR HIGHLY VISCOUS LIQUIDS you can't beat the double-helical gear rotary pump. Over thirty years' experience in a wide variety of services has proven this.

Worthington's double-helical or "herringbone" gear rotaries are specially designed to handle extremely viscous or lubricating liquids. Each unit operates smoothly and quietly whether its capacity is 1 or 5,000 gpm. All sizes have a maximum pressure rating of 500 psi.

Other advantages of these gear type rotary pumps are: their ability to handle a considerable amount of air or gas in the liquid, and their use with steam jackets for pumping liquids that become solid in normal temperatures. Types GA for general service, GR for heavy-duty service. Type GRJ is steam jacketed. All units can be arranged for motor, turbine, engine, or belt drive with conventional stuffing box or mechanical seal.

Here's your widest choice in rotary pumps —both gear and vane types

FOR NON-LUBRICATING, SLIGHTLY ABRASIVE OR CORROSIVE LIQUIDS, Worthington has built its heavy-duty sliding-vane type pumps. Here, the pressure of the liquid maintains contact of the vanes against the liner so that wear is automatically compensated for. All pumps are fitted with removable liners. End plates and vanes can be reversed if necessary.

External bearing models will handle non-lubricating, slightly abrasive or corrosive liquids without bearing failure, even though heads are relatively high.

External or internal bearings, capacities from 25 to 1,000 gpm, all with maximum pressure ratings of 200 psi. Type VE has external bearings, Type VR has internal bearings. Both available with or without relief valves.

Whether you pump lubricating or non-lubricating liquids, highly viscous or highly volatile, small or large capacities—check the *complete* Worthington rotary-pump line before you buy. For further information write for Bulletin W-487-B10B on Heavy-Duty Gear Pumps or Bulletin W-485-B1 on Vane Type Pumps. Worthington Corporation, formerly Worthington Pump and Machinery Corporation, Reciprocating Pump Division, Harrison, N. J.

P-2.1

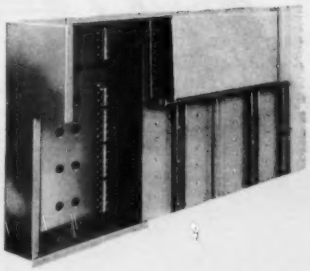
The World's Broadest Line Assures You the Right Pump for Every Job

WORTHINGTON

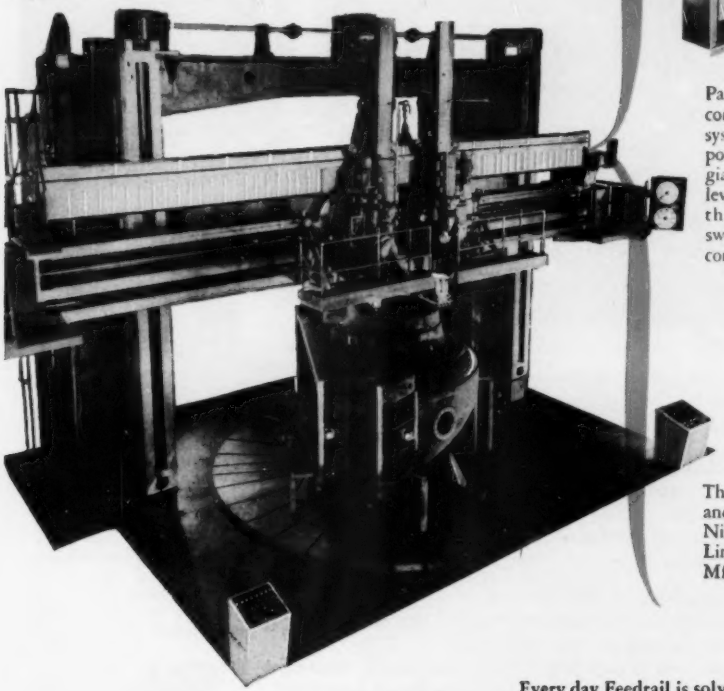
Rotary Pumps

ELECTRIC FEEDRAIL®

"Nerves" for a 30-ft. giant



Partial view of 79 pole, multiple conductor Feedrail trolley busway system that distributes current for power and control of this 30-ft. giant mill. Except for critical hand lever adjustments, all control is through buttons and selector switches located in remote dual console stations.



This huge thirty foot vertical boring and turning mill was built by the Niles Tool Works Div., Baldwin-Lima-Hamilton for Allis-Chalmers Mfg. Co.

Giant thirty foot boring mills are not built every day. When they are, precision control is essential. A 79 pole multiple conductor Feedrail provides the "nerve system" for finger-tip control and dependable, unfailing power supply for this massive machine.

Every day Feedrail is solving power and control problems. Moving trolley outlets in an enclosed track roll with electric tools which must follow work. Power machines move in and out of work centers quickly, and produce more work in less time. Feedrail flexibility is engineered into standardized units that assemble to give a "tailored to fit" power supply system. Write for literature.

Sold by leading electrical distributors.

46-C

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YARNALL-WARING COMPANY
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the steam trap designed with more production in mind

For Fingertip Information— Consult The Plant Library

A well-organized plant library is of great assistance to an engineering staff . . . Up-to-date engineering facts are yours for the asking . . . If you want a new book or catalog, just fill in the New Literature form . . . Check-system and index files enable librarian to keep track of all literature . . . Here is how one plant operates its industrial library

By JANET DUNHAM, Librarian, Engineering Div., Kodak Park Works, Eastman Kodak Co., Rochester, N. Y.

THE ENGINEERING Division of the Eastman Kodak Co., located at the Kodak Park Works in Rochester, New York, is responsible for the design of production facilities for the company, including buildings, machinery, equipment, and services. The personnel of the division numbers approximately 400 engineers and draftsmen.

The primary function of the Engineering Division Library is to assist this staff by quickly obtaining reference material in various branches of mechanical, electrical, chemical, civil, and architectural engineering. It is the purpose of this article to describe, in some detail, the arrangement, organization, and operation of this library.

In a room with about 600 sq ft of floor space are filed about 45,000 pieces of material, necessary index and record files, a reading table, magazine rack, and desks for the librarian and assistant librarian.

The present collection of approximately 500 reference and engineering books, with room for future expansion to 700, occupies 100 ft of shelves 16 in. high and 10 in. in depth. The plan is to keep the number of books to a maximum of 700 by continual replacement of obsolete material.

A magazine rack, located in the center of the room with 64 slots 10 in. long, 12 in. deep and 2 in. wide, holds recent issues. At the base of the rack, 8 open faced slots 10 in. long contain miscellaneous trade papers and booklets. Back issues, for two years, of 62 magazines are stored on 140 ft of shelving. Long time storage for back issues not readily obtainable from other libraries is available in a store room.

Located under the book shelves are 84 file drawers which contain over 3500 folders of building and equipment design data used constantly by the engineers. Since this material and its filing system are peculiar to this library, they will simply be mentioned and not enlarged upon.

An extremely useful collection of information on many subjects is filed in approximately 600 folders. These, with a collection of codes and standards and certain other information, occupy 13 standard file drawers.

An up-to-date catalog file is invaluable to an engineering organization; but unless such a central file is constantly kept complete and current, the staff soon loses confidence in it and tend to set up their own individual files. In the engineering organization this tendency has been largely overcome through a collection of over 10,000 catalogs which are kept current and are charged out in the same manner as other material. These catalogs are housed on 75 additional feet of book shelves and in 72 standard steel file cabinet drawers.

How Material Is Classified

All material in the library is classified according to subject, author, sponsor or manufacturer, supplemented by many cross references. A different type of sign-out card is used for each type of material. These cards, which are contained in pockets in the sign-out table, are filled in by the borrower and ultimately filed systematically. Over 2500 items per month released by the library may be readily located by this system.

Magazines: Date of receipt of maga-

This view of the Engineering Division Library at Kodak Park Works shows magazine rack in the foreground, book shelves at right and the numerous filing cabinets which contain catalogs and other engineering data. Note sign-out table in front and to right of rack with pockets containing the various forms used

zines is entered in an inventory book. Each copy is stamped with the "property" stamp. Magazines are not circulated but photostatic copies of the contents tables are distributed throughout the organization, and the magazines themselves are loaned only upon specific request. By this means, copies can always be located.

A number of the engineers are assigned to review certain publications and to check all articles of interest. The librarian also scans all material received and calls the attention of those who may be interested to any item which may be of value. Items which may have future value are noted on index cards in a general subject file.

Books: Books are classified according to a devised decimal system. The following example is not complete but illustrates the system.

010 Miscellaneous
012 Government
015 Photography
020 Reference
021 Bibliographies
030 Engineering General
031 Patents
032 Economics
034 Handbooks

Information File: This file contains a collection of magazine articles, pamphlets, data, test results, notes, reports, and general information relative to the engineering field. A card index lists alphabetically the subject headings of the folders in the file. All material filed in each folder is listed on the card. Many cross reference cards aid in the search of material.

Standards, Laws, and Codes: Standards, laws, and codes published by various associations, companies, government departments and bureaus are filed alphabetically by sponsor in this file. Each is identified by a sticker (illustrated) which is placed on the left hand side of the material.

LAWS, CODES AND STANDARDS
Sponsor .....
No. .....
Date ..... Description
RETURN TO
ENG. DEPT. LIBRARY
KODAK PARK WORKS

The index is similar to the Information File system. In addition to the "sponsor" cards, many "subject" cards are also included.

All American Standards Association publications are filed numerically under sponsor. The ASA publishes a "List of American Standards" which includes listing by number and subject index. This is filed in front of the pamphlets and serves as an index to the file. A card index file is kept on all pamphlets purchased, listing ASA number, date, sponsor, and title. These are filed numerically.

Catalogs: For such a large collection of catalogs, filing alphabetically by manufacturer proved to be the most efficient method, supplemented by an index listing manufacturers by subject which in turn is supplemented by the *Thomas Register*. The "manufacturer" index cards contain the title, bulletin number, date of issue, and filing date. Each catalog is assigned a number in chronological order. If duplicate catalog material is filed, the assigned number will be 1, 1A, 1B, etc.

A sticker is glued on the left hand side of each catalog where no information will be concealed and where it can be easily read in the files. The following sample shows what information is given:

Mfgr. .....
Assigned No. .....
Date ..... Rec'd. .....
RETURN TO
ENG. DEPT. LIBRARY
KODAK PARK WORKS

Certain firms manufacture a number of unrelated items. Such catalogs are subdivided under the manufacturer's name according to subject. The subject is listed as part of the assigned number on the manufacturer's card and on the sticker.

A small number of catalogs have been assigned permanently to engineers who use them constantly. In order to keep these up-to-date, records are kept by listing their names in a notebook under the manufacturer's name.

Source of New Material

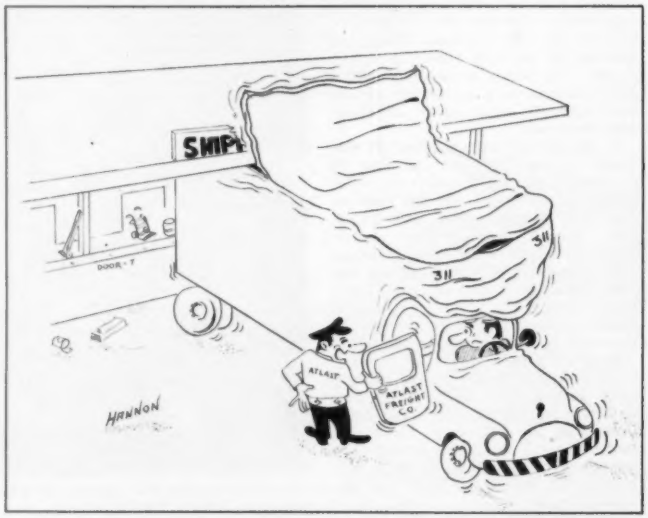
Publishers' catalogs, bulletins, and book reviews in the various trade magazines are the main source of procurement of books. As a rule, book purchases are requested by the engineers by means of a "New Literature Card" (illustrated below) approved by a supervisor. Usually, purchases are made on approval and are reviewed by the requester before processing.

NEW LITERATURE
Send to Eng. Dept. Library
Please secure the following:
Book ☐ Mag. Subscr. ☐
Catalog ☐ Pamphlet ☐
Title or Desc. .....
Co. or Publisher .....
Notes .....
Your Name & Unit .....
Approved by
(Supv. or Consit. ..... Date.....
(Not Req. for Catalogs)
Signer will be notified when material is received.

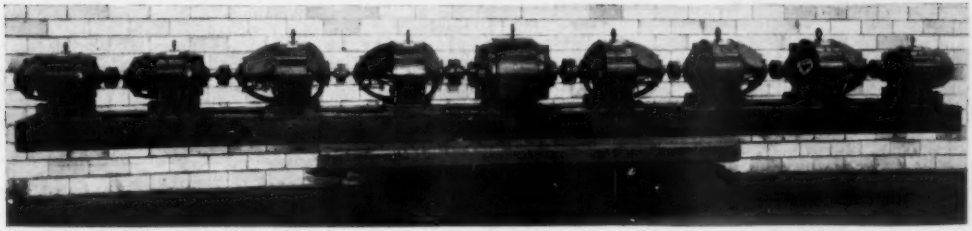
The librarian who is really proficient can render great service to an organization and can save others endless hours of research for needed information. Acquisition of new material, maintenance of complete and up-to-date information and notification to personnel of new additions are important.

The rapid procurement of material required by the engineers is an important part of a librarian's job. This requires an extensive knowledge of sources: where to find the material in the library, where it may be available from outside, and whom to ask for suggestions.

A monthly library report of all important material added should be circulated throughout the organization. This can also contain a list of articles appearing in current publications which may be of interest.



"Don't stop now. The company can use another good open-top!"



Here is an unusual example showing arrangement of nine standard two-bearing machines connected by flexible couplings

Select Couplings to Fit the Job

The proper selection and installation of a coupling for a particular job will eliminate trouble at a later date . . . Should a solid coupling be used? . . . Would a flexible coupling serve the purpose? . . . This article discusses couplings and suggests where they should be used

By J. W. SAMZELIUS, Motor Engineering Dept., Motor and Control Div., Westinghouse Electric Corp.

WHY DID the bearing in that MG (motor generator) set burn out so soon? Was the lubrication at fault? Maybe so, but in many such cases the cause was born the day the set was put into operation and has its roots in two possibilities: (1) improper installation of the coupling; and/or (2) improper selection of the coupling.

To avoid such premature failures, the field engineer or service man should be completely familiar with the types of coupling available plus the where and how of application, whether he is concerned with the coupling of complete machines or incomplete one-bearing units. The speed and torque requirements may also dictate the type of coupling to be used. It all reduces to preventive maintenance—stopping it before it starts!

From the viewpoint of the field engineer or service man there are two classes of applications involving the use of couplings:

Two or more machines mounted on a common bedplate and connected by couplings selected by the manufacturer of the equipment—In such applications the machines can be assumed to have been mounted correctly at the plant and to be connected by the proper type of coupling. Any correction of the line-up by the service man is therefore due to some change in the original line-up, sometimes caused by abuse during transport or, more often, by the bedplate being pulled out of shape by the holding down bolts in the foundation.

Applications involving coupling of a self-contained motor or generator to the customer's power consuming machine or power source, with or without the benefit of a common bedplate—In applications of the latter class the field engineer may have to do a certain amount of engineering in regard to the selection of the coupling and the design of the mounting.

Essentially, two types of couplings are available, each with its special fields of application, and are known as solid couplings and flexible couplings.

Solid Couplings

Solid couplings that are properly machined and installed make the individual shafts the equivalent of one long shaft, hence all bearings must be lined up on the same centerline.

If the shafts and the bearings are in perfect alignment but the face of the coupling is not square with the bore, or if any obstruction prevents the coupling halves from seating properly when bolted up, the coupling will tend to force the shafts out of line. As the shafts are held in line by the bearings, these forces will bend the shafts and, if the distortion is of sufficient magnitude, the reversing stresses occurring with rotation may break a shaft. Even if the shaft stresses are not sufficiently large to cause breakage, the distorted shafts may cause vibrations and excessive loading on the bearing, all of which tends to give unsatisfactory service.

Solid couplings have found wide use in MG sets having only one machine equipped with two bearings while all other machine rotors are supported by one bearing and the solid coupling. Such an arrangement, Fig. 1A, permits close spacing between the machines and is economical to build and operate.

Similar arrangements may be made with pedestal-type bearings that are completely separate from the frames. The basic principle is to have one bearing more than the number of machines and to support all shafts, except one, on one bearing and one coupling.

To make the connection between the coupling halves positive laterally, so that the weight of a heavy rotor supported by the coupling cannot cause one coupling half to slide over the face of the other half, the couplings are made with a male and female fit in the face. This spigot fit is made concentric with

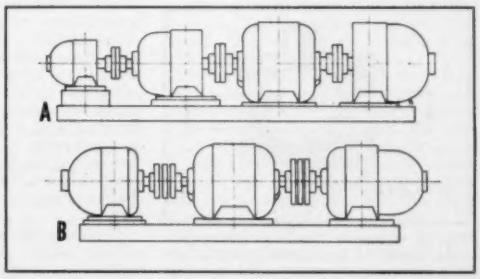


Fig. 1A. Solid couplings find wide use where one machine is equipped with two bearings while all other machines have their rotors supported by one bearing and the solid coupling; Fig. 1B. Ideal application for flexible couplings is where complete units with two bearings each are connected

This is the first part of a two-part article. The second part, which will appear in an early issue, deals with the proper alignment of couplings.—Editors

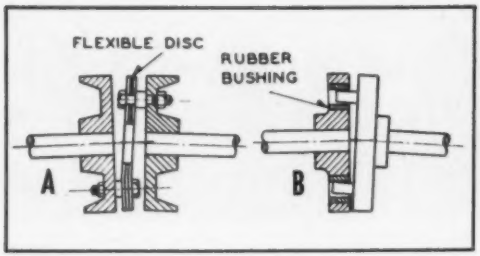


Fig. 2A. Resilient member of coupling may be composition disc clamped by alternate bolts to rigid flanges or hubs on the shafts, or, as indicated in Fig. 2B, it could be a rubber bushing

the shaft bore and is a valuable aid in the lining up of the shafts.

Sometimes the coupling flanges and shaft are made in one piece, or one half may be enlarged to form a flywheel. Such features are only variations in design. Fundamentally, it is still the same type of coupling.

Flexible Couplings

Because of the design of the flexible coupling, it cannot impose bending stresses upon the shafts or excessive load on the bearings. It may, however, by readily permitting connection of the two shafts which are not aligned, be responsible for vibration of the set and internal wear of the coupling itself and result, finally, in breakdowns and interruption of service.

For these reasons, the shafts in all coupled applications should be lined up with the same high degree of accuracy, regardless of the type of coupling applied. As most installations are subject to changes during operation by factors such as thermal expansion, settling of foundations, wear, accumulation of dirt, corrosion, etc., flexibility in the coupling is an assurance that a properly lined-up installation will continue to run satisfactorily even though adverse conditions may develop with time.

Flexible couplings are strictly limited to transmittal of torque and must, therefore, *never* be applied where the coupling is supporting one end of the rotor, such as is the case with solid couplings, Fig. 1A.

Complete units having two bearings each that are to be connected with a minimum of expense present the ideal application of flexible couplings, Fig. 1B. Briefly, flexible couplings can be divided in two groups according to their design:

Resilient member type—Flexibility in coupling is obtained by use of a resilient member. This resilient member may be a composition disc clamped by alternate bolts to rigid flanges or hubs on the shafts, Fig. 2A, or it may be a combination of rubber bushings that provide a resilient lining between driving pins in one coupling and corresponding holes in the other, Fig. 2B.

Spline or gear couplings—Flexibility is provided by the sliding motion between otherwise rigid members, Fig. 3.

The conventional flexible coupling shown in Fig. 2A is a good example of the resilient member type. It has a resilient composition rubber and fabric disc, clamped alternately to the steel flanges making up the coupling halves. The cross-section of the disc and the method of clamping makes the coupling quite rigid against shaft offset and torsional distortion while it yields readily to small angular misalignment between the shafts.

This coupling is available in several sizes in ratings from 5-hp to 250-hp at 1800 rpm and will give good service in moderate speed applications over a period of years.

For smaller ratings, inexpensive jaw couplings with resilient inserts or Neoprene sleeves with steel inserts are commonly used to obtain flexibility in direct drives.

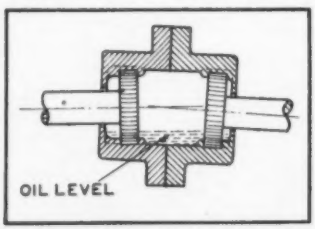


Fig. 3. Spline or gear couplings provide flexibility by allowing sliding motion between otherwise rigid members

Spline Couplings

Spline couplings are made by several well known manufacturers. Fast, Poole, and Waldron couplings are all of the spline or gear type, shown schematically in Fig. 3.

The Falk Steelflex coupling is also a spline type coupling, but has the spline keys replaced by a one piece wave-shaped spring. The spring engages a number of notches (keyways) in each coupling half and transmits torque from one half to the other by being subjected first to bending and, eventually, as the load is increased, to shear. As long as the spring is loaded in bending, it will cushion torsional shocks and reduce vibration due to variations in torque.

Because of the sliding motion which takes place between the splines or teeth in all spline-type couplings, a lubricant is necessary and therefore the housing is designed to hold oil or gear lubricant.

Intricate machining and accuracy of dimensions make spline couplings relatively expensive, but compactness, neat appearance and good performance, particularly at high speeds, has made these couplings popular in many fields.

One point often overlooked in the application of spline couplings is the fact that this coupling transmits axial movements and thrust while transmitting torque. This condition may place heavy thrust loading on a bearing not intended to carry thrust and must be considered.

The Westinghouse-Armstrong coupling, also referred to as a semi-flexible coupling, is somewhat similar in design to the conventional fully flexible coupling described earlier. The difference is in the flexing element which consists of ring-shaped spring steel laminations supported at the outer periphery by one coupling flange and at the inner periphery by the other, Fig. 4.

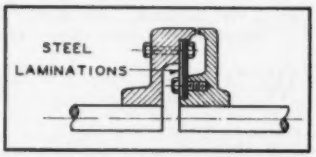


Fig. 4. The flexible element of this coupling consists of ring-shaped spring steel laminations supported at outer periphery by one coupling flange and at the inner periphery by the other

The laminations are accurately ground inside and outside to concentricity and snug fits in respective coupling hubs, therefore this coupling requires as accurate a line-up of the shaft centers as a solid coupling. The laminations are bolted alternately to the two flanges and have sufficient flexibility sideways to permit small angular misalignments between the shafts.

Because of great transverse rigidity and positive seating of the laminations in both hubs, this coupling can support one end of a one-bearing rotor just as a solid coupling does. It has been used extensively in engine-driven one-bearing generator sets and in one-bearing motor-driven speed reducers.

Keep Your Copy Intact

Readers wishing tear sheets of any article appearing in the issue for their personal file may obtain them by indicating the item desired on one of the post cards appearing in this issue. — Editors

Watch Out for Red Lights In Project Planning

The author, an experienced plant engineer and familiar around his company's construction projects, warns of the following red lights: 1. Planning must be thorough; details must be complete. Mistakes may mean increased costs . . . 2. Select the general contractor with care and only after complete investigation . . . 3. There are many types of contracts; make sure that yours fits all conditions of the job . . . 4. Effective management of contractor-plant engineer relationships . . . 5. Plant engineering supervision of the project while it is under way . . . 6. Finally, relations with unions and union representatives

By **GEORGE F. BOSCH**, Plant Engineer
Mechanical Goods Division, The General Tire & Rubber Co.

KEY TO THE SUCCESS of any project, regardless of how large or how small in size, consists of the basic factors of: planning; organization; and follow-up.

When these have been properly adhered to, properly coordinated and correlated, no project, regardless of its magnitude, should become a failure.

It is the aim of this article to emphasize to the younger engineers in plant engineering departments the intrinsic value of these factors by citing a specific example.

As an illustration, let us take the construction of a manufacturing plant of some 150,000 sq ft of floor space.

Not all the details involved in the execution of the work will be discussed; we will consider only the major phases involved with the thought of applying the following as a yardstick to any project.

The Planning Phase

Here, it should be emphasized that planning must be thorough. Details must be complete. Mistakes or changes during construction are costly, and will reflect upon the final cost of the project.

Here, we encounter our first red light. An increase in costs may mean: The engineer's plans were incomplete; The engineer underestimated the final cost and, therefore, not enough money was appropriated by the management to do the job; Errors were made in the specifications or certain items were not covered by the specifications; Errors were made at the time of planning due to lack of proper information from all parties involved in the layout; Entirely different manufacturing setup than one originally planned for; Increase in the cost of purchased materials and increase in labor wage scale.

The engineer's $64.00 question is —Management's reaction? Are they going to allocate additional funds? If it is *his* fault, what steps are they going to take? Will there be another engineer to take over?

It is very important for any engineer to analyze and carefully recheck his figures before submitting the final cost to management for approval.

He must prepare a complete breakdown of his project, make a summary of costs similar to the one following: cost of land, surveying, insurance during construction, permits, licenses, etc., clearing site, temporary utilities, temporary telephone, general construction work (structure proper), sewer work, plumbing, heating, ventilating, sprinkler system, lighting, electric power requirements, fire alarm system, painting, walks and drives, fencing, railroad siding, and truck ramp.

To this list may be added a few more such as, architect's or engineer's commission should the structure be designed by an outside firm, cost of preliminary engineering work, cost of travel for architect or engineer, and so on.

As stated before, it is important that a complete breakdown is made in order to avoid a shortage in the funds to be allocated. All bids from the various trades (heating, plumbing, electrical) must be checked and complete so that Management will know what they are buying or getting for the money expended.

The layout enters also in the planning phase. This, as described in an earlier article[1] consists primarily of designing the building to fit the job. The technique involved in the proper layout of a plant is the proper balance of operations, one-line flow, adequate service centers, short moves, elimination of backtracking, proper material handling, adequate transportation, as well as provisions for future expansion.

The above is achieved through the combined efforts of the departmental general foreman, the time-study manager, the production superintendent, and the engineer.

The design and specifications are also a part of the planning phase. In some industries, this rests as a function and responsibility of Plant Engineering. In others, the job may be released to an outside engineering firm.

However, regardless as to who is the designer, economy should be the focal point of the new structure. A good design should offer economy in building costs, be structurally sound, and be flexible and simple.

One more important item which ought to be added is that Preventive Maintenance starts with the design and purchase of equipment involved in the processing.

The specifications should be clear, concise, and complete in every respect. This is just as important as the accuracy of the plans.

Prior to the release of the plans for bids, the engineer must have filed a copy with the State Building Commissioner to ascertain the fact that the plans and specifications drawn up are in accordance with the State Building Code, the State Fire Marshal's regulations, and the State Board of Health.

Approval of the above is for the benefit and security of the owner as far as the safeguarding of life,

[1] See "The Plant Engineer's Responsibility in Construction Work," by George F. Bosch, March, 1952, Plant Engineering, page 93.

health, and property is concerned.

Complete plans and specifications are very important, not only from a final cost angle, but also from the "close" competition in bidding. In other words, all bidders must be given the same story. They must all speak the same language. There should not be any doubt left in their minds as to what is demanded. Therefore, when all are on an equal basis, may the best man win at the time the bids are opened for the final award.

Selecting Contractor

Among the important steps to be considered, before a contract is awarded, is the selection of the general contractor. This is the second red light. Some of the steps taken to check his integrity and credentials are: his reputation in his community; his rating with Dunn and Bradstreet, Inc.; his rating at his local bank; his rating with the Association of General Contractors; his reputation among the various trades; his reputation among civic organizations.

Other points of equal import are: his professional reputation among architects and engineers; his facilities. What type and kind of equipment does he have? What about his construction superintendents? Are they well qualified or will the field engineering layout have to be performed by a member of the Plant Engineering Department?

Also, investigate the following: what is his payroll? How many people does he employ? What about his accounting system, does he keep accurate records? Is he union or non-union? What is his standing with the local unions? How do they get along together? Check the business agent. What kind of workmanship does he do? Check former jobs. Get reaction from owners. How did they get along during the construction work? What type of insurance coverage does he carry?

The above, in a general way, summarizes some of the important questions which confront the plant engineer and, at times, the owner.

Types of Contracts

As far as the contract is concerned, there are many types and forms used in the building construction game. The type used depends a great deal as to the nature of the project, type of work to be performed, local conditions, etc.

Just to mention a few, the most popular types used are: unit-price contract; lump-sum contract; cost-plus contract; fixed-fee contract; cost-plus a bonus contract; cost-plus a penalty contract; percentage contract.

The importance of the above can be called the third red light as it will define among many other things the position of the builder, the owner, and the engineer.

The Organization Phase

Once the contract has been released, the general contractor and the engineer have a great deal of work to do, and this can be considered as the fourth red light.

First of all, the contractor must file with the Owner's Purchasing Department his Certificate of Insurance, Workman's Compensation, etc. In some organizations the job cannot be started nor the purchase order issued until the general contractor has filed with the Owner's Purchasing Department his Certificate of Insurance. This is an excellent policy.

The contractor must also obtain and transmit to the engineer permits, licenses, and any other allied papers. Photostatic copies of same will be made for the engineering files and the originals returned to the contractor.

Effective management being the keynote of the operation, the engineer must set certain policies in regard to general performance, work schedules, compliance to codes, grade of materials used. Check all the bids of the sub-contractors with the general contractor.

The engineer must work closely with construction superintendent. He must hold conferences when needed with the sub-contractors, such as, plumbing contractor, sprinkler contractor, heating contractor, electrical contractor, and so on.

The construction superintendent must coordinate his work with the sub-contractors in such a manner to let them know ahead of time when they are expected to start their job and make certain that their material is delivered on the job before the starting date. A loss of time will upset the working schedule and increase the cost.

Should any dispute arise regarding the interpretation and meaning of the plans and specifications, the decision of the engineer (as the owner's representative) shall be final and binding on all parties concerned.

All shop drawings furnished by the sub-contractors shall be checked and approved by the engineer prior to release. The construction superintendent shall be responsible for all materials, workmanship, transportation, scaffolding, tools, etc., for the complete erection of everything as shown on the plans or called for in the specifications. He shall be responsible also for all obstructions to the streets or damages to adjoining property.

All "change orders" during construction shall be in writing. This is important, especially so when it becomes time to tabulate all "extra"

Photo: The International Nickel Co.

Relations with business agents and individual workmen must be good. Many crafts are represented on every job such as this one where the workman is installing porcelain enamel steel panels to the building with attachment clips

Upon completion of the project the construction superintendent should turn over the structure to the engineer-in-charge, broom clean prior to final inspection

work not a part of the contract or original specifications. This will eliminate guesswork. All changes ordered shall be issued in triplicate, in numerical sequence and signed by the engineer.

Upon completion of the project, the construction superintendent shall turn over to the engineer all inspection certificates and the structure shall be broom clean prior to final inspection and acceptance by the engineer and owner.

The engineer should also arrange for watchman, fire protection, availability to contractor of plant first-aid service, furnish doctor listing, give location of field office, arrange for temporary telephone service, temporary light and power service, temporary water facilities, and toilet facilities. Should there be a cafeteria on the premises, the engineer may grant permission to contractor to use same.

The Follow-up Phase

This is the fifth red light in the over-all program. Like all the others, it is an important one as it deals with supervision while the project is under way.

It is up to the engineer to set up controls with the general contractor. These are very important as they affect primarily the performance of the project.

The methods of control used are:

a—A daily construction log giving a "blow-by-blow" description of daily occurrences, shortages, materials delivered to site, number of men working, type of work performed (such as, clearing up site, started excavation for foundation, carpenters making forms, etc.), kind of weather—in case of rain, what worked, first aid rendered, and so time were the men sent home, hours on.

b—Maintain a weekly "percentage of completion" chart.

c—Make a monthly work progress report.

d—Take work progress photographs.

e—Establish cost control through daily cost records. Invoices should be paid on the first and fifteenth of each month. Contractor to have time keeper and cost clerk on job.

f—Make weekly inspection of project.

g—Make a summary of field expenses after the building operations have been completed. This summary usually includes all extra work not a part of the specifications nor of the original contract.

And last but not least, comes the sixth red light dealing with relations with the unions working on the project.

The precautionary measures to be taken by the construction superintendent should be:

a—Be familiar with union rules and keep on hand in the files of his field office a copy of the rules and regulations of each trade working on the project.

b—Be familiar with the latest wage scales and keep on file a copy of same as furnished to him by the business agent.

c—Make it his business to meet the business agents and have the opportunity to discuss the project with them in a general manner. This is important. Should he require additional carpenters or plumbers, he would know who and where to call.

d—Any dispute arising among the trades as to jurisdiction or who is to do what should be settled immediately and promptly. This is important since he doesn't want any time lost on the project.

e—He should be an individual who is firm, knows his work from A to Z, be human, and use plenty of common sense. As his employer's representative (that is, the general contractor), he should make it his business to keep himself posted on all union changes and rulings. This is for his own advantage and benefit since he is the man on the daily firing-line.

f—He should be cooperative, fair, and willing to go along with his men as long as the matter is within reason.

g—He should not allow partiality. He will be much better respected by the men under him.

h—He should have "Unity of Command" and exercise proper control over the foremen under him. This, he can achieve by proper delegation of responsibility.

i—He should always give credit where and when credit is due. This, unfortunately, is overlooked quite frequently.

j—Finally, disputes can be settled through arbitration as a last resort.

Copper Infiltration

THE INFILTRATION process is aimed to get 100 per cent density by filling the porosities in powder metal parts with a metal of a lower melting point than the metal of which the part is made. Thus copper is used to infiltrate iron powder parts, achieving densities in the range of 99+ per cent.

According to *Stoke News*, a publication of F. J. Stokes Machine Co., the infiltration is accomplished by placing a small length of copper on top of the iron piece and heating until the copper melts, at which point the iron absorbs the copper as a sponge absorbs ink. The operation is usually done after sintering.

The amount of infiltrated metal to be used is determined by volume requirements, i.e., the porosity of the piece and the relative specific gravity of the infiltrated to the infiltrating material. Thus an iron piece (average sp. gr. 8.00) of 40 per cent porosity weighing 1 lb would require 0.4 lb of iron to reach 100 per cent density. For infiltration with copper (average sp. gr. 8.860) about 0.443 lb would be needed.

Tensile strengths are raised as a result of infiltration—around 40,000 psi for pure iron and 75,000 psi for iron mixed with graphite—to a figure of 90,000 to 100,000 psi. Heat treating will further raise this figure to 120,000 psi or more.

The infiltration treatment for iron powder parts is valuable for pieces which need unusually high strength or which will be subject to shock.

How to Wash Your Hands Of Industrial Skin Infections

All industrial solvents should be considered as probable dermatitis hazards . . . Other sources of skin infection are found in waxy oils . . . Also, in the use of materials which become polluted with foreign bacteria . . . Precautionary steps will aid in control of skin infections

By **JOANNA M. JOHNSON**, Director, Industrial Nursing Division, Employers Mutuals of Wausau, Wisconsin

KEEPING MACHINES and equipment at the highest peak of operating efficiency is a well recognized essential in the maintenance of a satisfactory plant production schedule.

Somewhat less apparent, but equally important to plant management, is the close control of environmental conditions which affect the health and efficiency of plant personnel. For, unless the manpower responsible for operating the machinery is at its highest state of productive ability, the total output of the combination of men and machines will fall below the desired level.

In the metal working industries, due to the nature of operations and the materials used, occupational hazards develop which directly affect the health of the man on the job and, in turn, his ability to produce.

Industrial dermatitis is a case in point. A study of the record of almost any metal working plant will show that the cost of medical care and lost time from skin infections is an important factor in the workmen's compensation costs unless a definite medical and engineering program has been put in effect. In the state of Wisconsin, for instance, the cost to employers in 1950 of dermatitis cases alone was $79,550.

Therefore, it is evident that the prevention and control of skin infection is a subject of vital interest to both management and plant personnel. In this article we will discuss a few of the major sources of skin infection and the manner in which these hazards can be kept to a minimum.

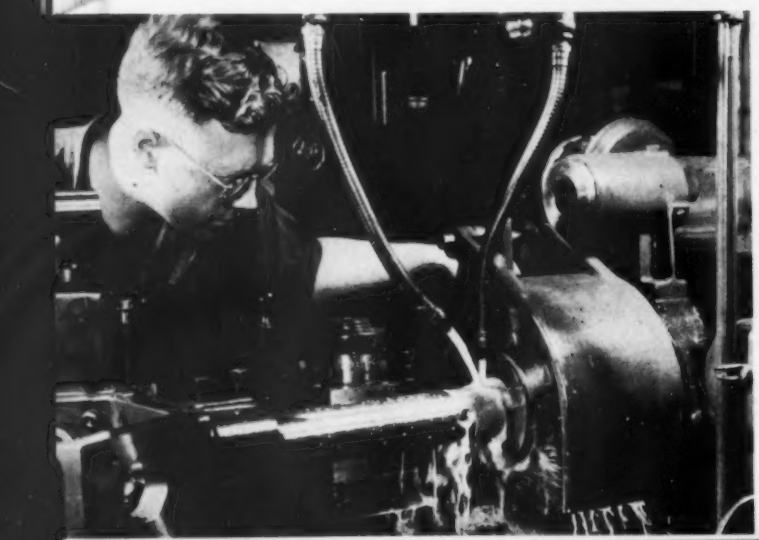
All industrial solvents, for instance, must be considered as probable dermatitis hazards and each process that involves the use of solvents, caustics and acids should be carried on with a minimum of contact with the skin.

A second important dermatitis hazard arises from materials which affect some people and not others. People affected are popularly referred to as "allergic." It is difficult to recognize the specific materials which cause these allergic reactions and in such cases the plant nurse assumes a very important role in aiding the physician to determine the cause and in the follow-up of remedial measures. In some cases she is able to recommend preventive measures, in others it may be necessary to shift an individual to other work.

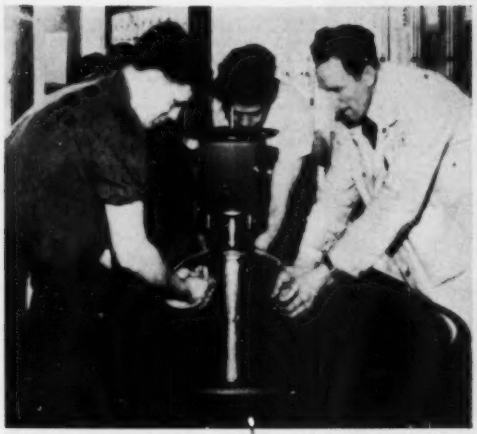
A third group of skin hazards is found in the waxy oils, such as chlorinated naphthalene, or the paraffine base cutting oils. These are divided into two large groups—soluble and insoluble cutting oils. In general, the soluble cutting oils contain mineral oil, soap, resins and other materials used as mutual solvents to stabilize and preserve the mixture of oil and soap. Their function is chiefly that of cooling the cutting tools, lubrication being a secondary function. Insoluble cutting oils consist principally of mineral oil, to which are added various percentages of animal and vegetable oils, sulphur and chlorine.

All such oils may plug up pores of the skin to the extent that it appears to have a rough and unclean surface. Unless scrupulous care is given through proper cleansing of the skin and the use of protective creams, infections may develop. It is here that the plant nurse's instruction of skin care is most essential and effective.

A fourth and perhaps the most difficult skin hazard to deal with involves the use of materials which become polluted with foreign bacteria. Organic cutting oil used in a continuous process, for instance, frequently becomes contaminated from boils or carbuncles of a worker and the infection is transmitted to others through the cutting oil. The intro-



With the right precautions, cutting oil and human skin will get along fine



Here's one way to send dermatitis problems down the drain

History of the exposure will be of real help to the physician

duction of an antiseptic may be useful but does not prove satisfactory in all cases. Frequent changing of oil is essential in this preventive program.

Each machine on which cutting oil is used should be thoroughly cleaned at regular intervals, and all chips and foreign substances, including old lubricants, removed. The operator or maintenance person responsible for removal of debris or metallic substances deposited in the containers should be well protected with gloves to avoid skin cuts which invite infection.

A cuspidor should be provided at each machine to discourage spitting or throwing refuse into the oil containers. Employees should be provided with aprons and armlets to protect them from flying chips and oil.

The following precautions will aid in the control of occupational skin infections. Put into effect in most plants, they will do much to reduce the discomfort, lost time and medical expense caused by skin troubles.

1. Constant attention to operations which involve potential dermatitis hazards, taking precautions to safeguard the employee to the greatest possible degree.

2. Enclosed methods of operation wherever possible.

3. Applying irritants through measures other than by direct contact.

4. Periodic observation of the operator to see that he takes necessary precautions.

5. Daily inspection of workers who are exposed to irritants, with special attention to fingers, forearms, neck, ankles and other exposed areas. This should be done jointly by the plant supervisory personnel and the plant nurse.

6. Program of personal cleanliness. Clean, unbroken skin and reasonably clean clothing have proved their importance in preventing skin irritations.

7. Demonstrations are of great value in teaching employees how to properly clean their skin. They can be carried on in small groups in the average plant dispensary. A bland soap should be used as well as clean towels. A clean, soft brush is also helpful. Waste cloths, which are frequently used for wiping, should be used only if they are clean and frequently renewed.

8. Protective creams may be necessary. If so, they should be provided and their use and application demonstrated.

The time and effort spent in training employees and in the desirability of the utmost cleanliness of their person and the machines on which they work can be a substantial investment in increased plant morale and productivity.

Belt Repair—Do It Early, Do It Right

IN ORDER TO GET the maximum service life out of conveyor belting, industrial users should take particular care to repair all belt damage as soon as it is discovered.

Belt fabric exposed to weather will absorb moisture if the protective cover becomes damaged, and may even become soaked. In warm weather, this condition leads to mildew and rot; in winter, ice crystals may gnaw at the fabric from within as the belt flexes. Thus, immediate repairs not only prevent the spread of damage, with its threat of premature failure, but also keep out the water which is the natural enemy of any conveyor belt.

Tools and procedures are outlined here by Newell Perry, belting engineer of Thermoid Company. An adequate repair kit includes sharp cobbler's knives and a stone to keep them sharp; emery cloth, rubber cement, inner tube patching rubber, rip plates and standard belt fasteners and accessories, together with rags and gasoline for cleaning. Belt remnants will prove useful in making repairs.

To mend long and deep cuts which go through to the fabric, open the cut and clean out all dirt. Then cement the cut closed, allowing the cement to dry thoroughly before the belt is restored to service. Where bits of torn cover leave exposed spots with only slight damage to the fabric, remove the loose ears of cover stock by carefully cutting a curved and bevel-edged area around the spot; then sand the edges, apply cement, allow it to dry, apply tire patching rubber and finally skive the patch flush with the belt cover.

Where gouges have penetrated the belt, or longitudinal rips have occurred, these points must be cleaned, sanded, cemented and reinforced with rip plates at three-inch intervals. Transverse rips require similar treatment with standard belt fasteners instead of rip plates. Use rip plates on longitudinal rips only, and standard fasteners on transverse rips only. When holes in the belting do not permit the simple use of rip plates and fasteners, cut out the hole into the smallest possible rectangle with its sides parallel to and at right angles to the belt edges. Then, from belting remnants, cut an exact fit for the hole and insert the piece, fastening it with belt fasteners all around the patch. Cement all edges thoroughly. Where it is necessary to prevent seepage of fines through belt repairs, remove one ply of fabric from a belt remnant and place it under the fasteners and rip plates.

The application of acoustical material will provide better working conditions

Noise can be a bothersome thing and this is especially true in industrial plants . . . Excessive industrial noises do not help a plant's productive record . . . Nor, is it pleasing to the ear of the worker . . . Sound conditioning will help restrict a noise to its immediate vicinity rather than bombard it all over the plant

All illustrations: Celotex Corp.

Fewer Headaches With Sound Conditioning

By CHARLES J. NOCAR, President, Acoustical Materials Association

AS A RESULT of the rapidly mounting interest in industrial noise control, the question frequently is asked, "What kind or type of acoustical treatment should be installed in a plant to insure maximum noise reduction?"

Most shops housing screw machines have similar noise characteristics; plants equipped largely with punch presses have a great deal in common, noise-wise, and most airplane manufacturing plants vary but little in the type of presses and machinery employed. Nevertheless, the differences in noise problems are still so marked that it is impossible to say with any degree of accuracy that material A is best for an airplane plant, material B for screw machine shops, or that material C does the best job in an area housing punch presses.

The answer in each case can be found only by studying the possible end results in each plant. These are governed by the physical properties of the plant building, the machine layout within the plant areas, the number of people exposed to the over-all noise, the relative positions of operators of noisy machines and the physical characteristics, or spectrum, of the offending noise or noises. Therefore, each plant must be studied in the light of what can be achieved by reducing noise through the use of acoustical treatment and what benefits may accrue to the people employed in the noise areas.

This is the first part of a two-part article. The second part, which will appear in an early issue, deals with the installation of various acoustical materials.—Editors.

Annoying Noises

To understand the use of acoustical materials it is helpful to review the various annoyance factors and explain how and why sound absorbing materials remove, lessen or take the edge off excessive noise.

First, highly reflective interior building surfaces cause multiple reflection of sound waves which produce a characteristic "ringing" or "roaring" noise. These multiple reflections have three principal effects:

1. Excessive reverberation (prolongation of sound); 2. Building up of intensity to abnormal levels; and 3. Spreading and diffusion of sound throughout the room.

These effects are increased greatly and add to annoyance through other factors, such as excessive duration of each noise, an unnecessarily high loudness level and difficulty in judging distance or direction of individual noise sources.

An effective method of eliminating these effects has been found in sound conditioning. Where physical conditions are favorable this treatment creates a relatively quiet environment by reducing the annoyance of sound reflection. Sound conditioning can result in:

1. Elimination of excessive reverberation (reflection) with resulting relief from prolonged exposure to noise impulses.

2. Increased ease of conversation.

3. Elimination of excessive build-up of sound intensity.

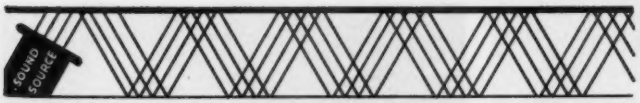
4. Reduction of spreading and diffusion of noise, with consequent decreased annoyance from distant sources. The latter is of particular importance when machine operations are gauged by "ear."

5. Filtering out of high frequency noise components which are known to constitute the most annoying segment of high noise levels.

Sound Conditioning Cuts Costs

A good example of how the use of acoustical materials can cut down noise was demonstrated in an Eastern plane plant's grinding room. The general sound level in this room, with 4 to 6 men grinding at their benches, was 100 to 102 decibels. Noise conditions were such that it was difficult to keep more than part of the men at their benches at one time. Periodically they had to let up and move outside to obtain relief. After being present in this room for a while, an unpleasant ring and a sense of temporary deafness was experienced for an hour or two after leaving the room. This effect was produced in as little time as 30 minutes.

After this area had been properly sound conditioned with acoustical material, checks showed that the intensity level was 98 to 99 decibels —with 12 to 15 men working at their



The customary hard surface in plants allows sounds to spread through any given area, adding themselves to the many other noises throughout the plant

The application of acoustical products to the desired areas quickly absorbs or "soaks up" the sound and prevents its spread to other areas in the plant

Workers are not greatly disturbed by the noises they themselves cause. It is the bombardment of noises from surrounding areas which distress them

Sound conditioning tends to restrict noises to immediate vicinity. Workers are conscious only of the machines close at hand when work area is sound conditioned

grinding benches. In direct intensity measure, this appears to be very little, but by comparison with the former condition, a very satisfactory improvement was evident.

Much of the nerve-fatiguing element was gone when the annoying "ring" was removed. The ring actually was caused, not by the intensity of the sound, but by the reflection or echoes which follow so closely on the heels of the original sound that they are heard, not as separate distinct sounds, but as a prolongation of the original sound. It was also significant that a 30 minute stay in this room no longer produced the after effect of temporary deafness.

The sense of relief obtained by sound conditioning this room was due largely to the changed characteristic and behavior of sound in the room, rather than to a drastic reduction in intensity. It is emphasized that a reduction of 3 decibels reduces half the number of acoustic units in a given sound. Intensities of 100 decibels involve sound made up of acoustic power running into tens of billions of units.

Another interesting result of sound conditioning in the plant is in the many instances where machine operators run their machine "by ear." Most experienced operators depend partially, if not wholly, upon sound to tell when all is well with their machine, and to warn of impending breakdowns or inefficient operation. Like the symphony director, they are always on the lookout for a sour note. When the reflected sounds in the average shop or plant are removed, each individual machine stands out more clearly for the operator.

A case in point is that of a wire stranding room in a cable plant. The superintendent of this department reported that defective stranding by a machine is usually preceded by a very high-pitched squeal. Before the place was sound conditioned, time was consumed in locating the particular machine at fault, as there were many machines in the room. But now he says he can spot the machine in trouble immediately.

How to Subdue Noise

Generally speaking, there are two methods of abating noise in a plant: either by isolating the offending machinery or by acoustical treatment. It is quite often necessary to combine both methods in the same area for effective results.

Local conditions, the problem, the building, etc., will determine the nature of the treatment in each case. Acoustical treatment cannot stop a noisy machine from emitting noise, but will prevent that noise from building up to an unnecessarily high level and from spreading throughout adjacent plant areas.

It is unnecessary to understand the physics of sound in order to select the proper acoustical material. All you need to know is that sound is vibration carried through the air. High-pitched sounds vibrate rapidly and low-pitched sounds vibrate less rapidly. The rate of vibration is expressed in cycles or the number of vibrations per second. In acoustical correction, materials are rated by their absorption of sound at the various pitches. In noise quieting, the average absorption at the four middle frequencies (or noise reduction coefficient) is used.

Because the industrial noise abatement field is a highly specialized one, it is not good policy to generalize or select a specific material for a specific job without first knowing all the contributing factors. It is therefore recommended that if a noise problem exists the plant management should first consult a reliable acoustical engineer. Most of the member companies of the Acoustical Materials Association provide such a service.

Generally speaking there are several items that should be considered when selecting an acoustical material. The main objective, of course, is to select a material for its sound absorptive properties, one that will meet the acoustical requirements of the room.

Other factors to be considered are: cost, light reflection, partial insulation value, moisture resistance where high humidity conditions exist, structural strength and maintenance costs.

Employee Incentive Plan Helps Reduce Waste Materials

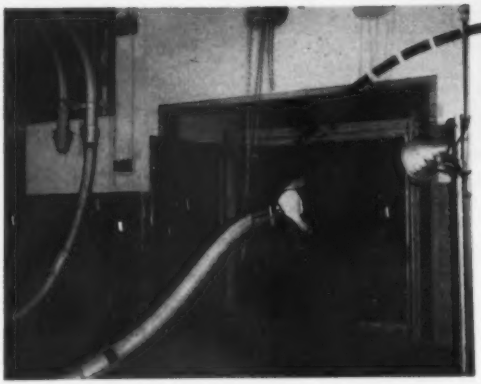
A PILOT OPERATION that may become an important industry technique in the conservation of critical defense materials has been instituted at the Westinghouse Lamp plant in Bloomfield, N. J. Substantial cutbacks in the supplies of tungsten, molybdenum, brass, copper and other critical materials forced Westinghouse to take aggressive action to make maximum use of their allotments.

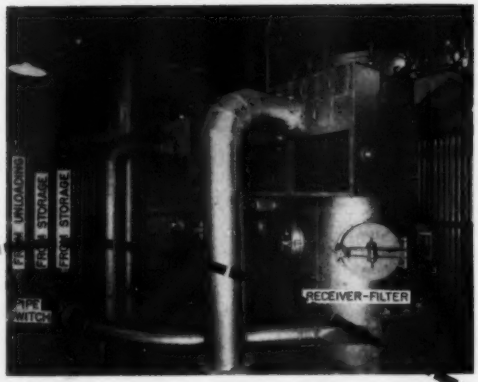
In an effort to reduce waste, Cappel, MacDonald and Co., Dayton, Ohio, were commissioned to plan a program of awards to employees who made a serious and continuing effort to conserve waste materials. Basis of the plan is an 11-month merchandise prize incentive program, and its purposes include: save critical materials; maintain production and jobs; and make the job of conservation more fun and more profitable to employees.

One phase solicits employee conservation slogans. In another phase, employee suggestions will earn points. To help combat absenteeism, attendance and punctuality will be rewarded. Other facets of the campaign include monthly material efficiency, quality achievements, and safety records. Periodically, an inspection team will judge plant housekeeping, and award prizes.

At the end of each month, each employee receives a prize point check, redeemable at the Westinghouse Prize Bank for merchandise prizes.

BULK UNLOADING FROM TRUCKS is accomplished at this point. From here it goes to the combination receiver-filter which is located in the conveyor house at right . . .





PIPE SWITCH IN CONVEYOR HOUSE is shown at left and the receiver-filter, where the air is separated from material, is at right . . .

GRANULAR HANDLING with SPEED,

Usual undesirable methods attendant upon bulk handling and storage of granular plastics have been eliminated in this installation of pneumatic conveyor system at Western Electric's Shadeland Avenue plant in Indianapolis . . . Although higher in first cost and operating cost the author shows why his company was influenced in its choice of a pneumatic system . . . Details of safety features and control

By **E. C. LANG**, Factory Planning Division, Western Electric Company, Indianapolis

OVER the years Western Electric Company's use of plastics, particularly in the manufacture of telephone sets, has grown rapidly. The Company's Indianapolis Plant, where telephone sets are made, is equipped with more than seventy molding presses having capacities up to 600 tons, and its use of molding material runs into several million pounds a year on a normal basis. Other plants of the company in other locations also consume substantial quantities of plastics of various types.

Phenolic resin compounds (thermosetting) and cellulose acetate type compounds (thermoplastic) are the plastic materials used most in the manufacture of telephone sets. These materials originally were obtained in 250 lb drums, and ultimately the quantities involved created problems of handling, storage, stock control and containers. Also, the usual handling methods in the molding department were attended with undesirable conditions, especially spillage which caused waste as well as slippery floors and respiratory hazards.

Therefore, the possibilities and economies in bulk shipment with local conveyor handling and storage of these plastics were explored with favorable results. Two such systems, one for thermoset compounds and one for thermoplastic compounds, are now installed at the Indianapolis Plant.

Local conditions govern the choice between a pneumatic conveying system and a mechanical conveying system. Pneumatic handling is comparatively higher in first cost and in subsequent power cost. However, our choice of the pneumatic system was influenced by the following factors:

1. It has the advantage of being adapted to turns and long runs.

2. These plastics, particularly the thermoset compounds, contain dust and a relatively clean pick up is provided with a pneumatic system; it also has the advantage of cleaning ease.

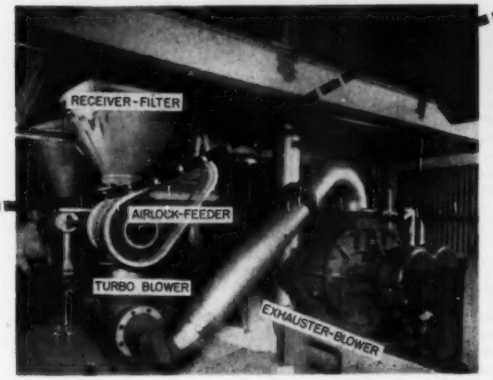
3. There is possibility of dust explosion in handling these plastics. Tests in pneumatic systems showed that the velocity and turbulence in the lines and the high ratio of material to air would not support ignition.

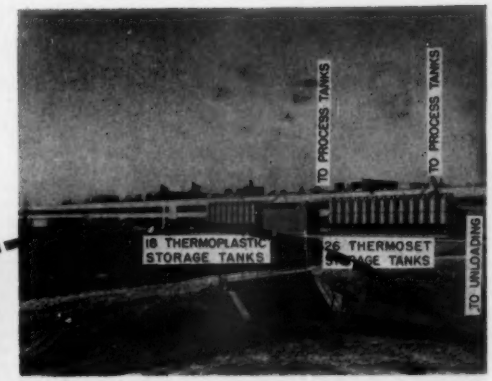
4. In a pneumatic system, the designer can readily meet the problems of dust-tight and weather-tight construction and can design for strength against explosion and fire hazards.

Our unloading station is located in the northeast section of the plant next to a truck dock and railroad spur. Facilities are provided for unloading from either bulk shipments or from drums; however, practically all receivals now are in bulk. Dual systems of 5 in. diameter suction piping extend about 400 ft from the unloading dock to the conveyor equipment and power house from where the compounds are delivered under pressure to the storage tanks. The conveying capacity of each system is 10,000 lb per hour.

The thermoset compound storage facility is designed to provide a 6 to

BENEATH EQUIPMENT in preceding photo is the exhauster-blower which discharges the air into the pressure line. Material is delivered to centrifugal separator, top of storage tank . . .





STORAGE TANKS ARE AT REAR of plant and are equipped with high level controls and low level indicators which give operators time to act on intelligence given

SAFETY by PNEUMATIC SYSTEM

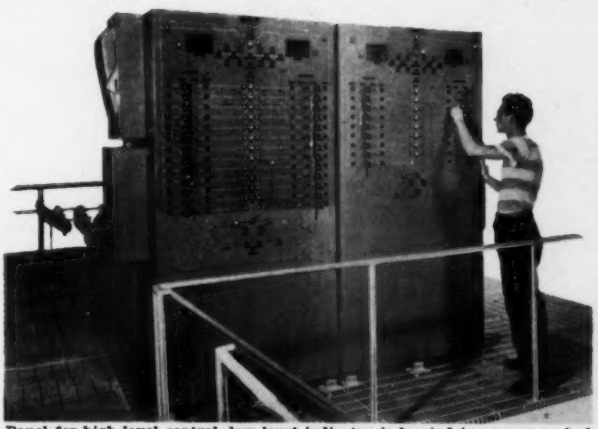
8 week reserve supply and consists of 26 tanks which are 7½ ft in diameter. The tanks have cone-shaped bottoms and an over-all height above the foundation of 30 ft. Each tank holds approximately 28,000 lb of compound or the equivalent of one bulk truck load. The tanks are arranged in two adjacent rows with conveyor delivery and air return piping manifolds installed above a cat walk between the rows. The manifolds are equipped with flexible pipe switches so that connections can be readily made with toggle fittings to any one of the material separators installed on top of the tanks.

Tanks are designed to withstand an optimum explosion pressure; however, as an added precaution the tops are equipped with vents having code relief areas. Considerable thought was given to the possibility of the undesirable segregation of coarse and fines in the tanks, but this proved to be no problem because the material, in feeding out of a tank, funnels down through the center from the top of the pile with the surrounding top material rolling down to the center section as the tank is emptied, automatically remixing the material.

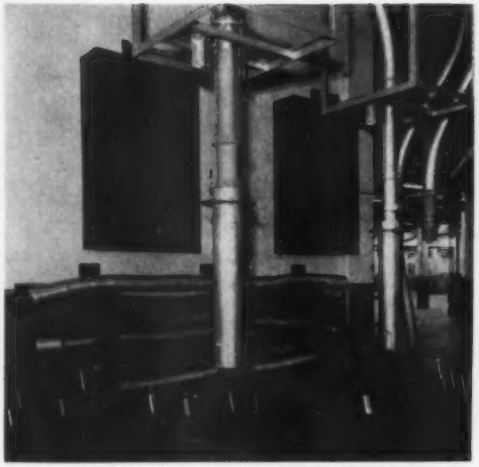
A conveyor suction manifold pipe is installed along the bottom of each row of tanks and is connected to an outlet flange on each tank through a motorized combination air lock and feeder. Compound is fed at a predetermined rate from the bottom of any one tank into the suction manifold and flows into the conveyor machinery house from where it is delivered under pressure to either of two 5000-lb capacity process tanks which are located about 200 ft away and above the roof of a building annex containing the preform presses.

From either of these tanks the compound is gravity fed through chutes down to hoppers on the presses. This arrangement provides the flexibility whereby either of two different brands of compounds can be supplied to any press at any time. Except for short periods twice a day when the process tanks are being refilled, the conveying system is available for unloading incoming shipments.

The thermoplastic compound unloading and storage system duplicates the thermoset compound facilities in all respects except for storage capacity which consists of 18 tanks. The delivery part of this system differs from the thermoset com-



Panel for high level control, low level indicator is located in conveyor shed



Terminal for the drum unloading station for both thermoplastic and thermoset plastic granules is part of system

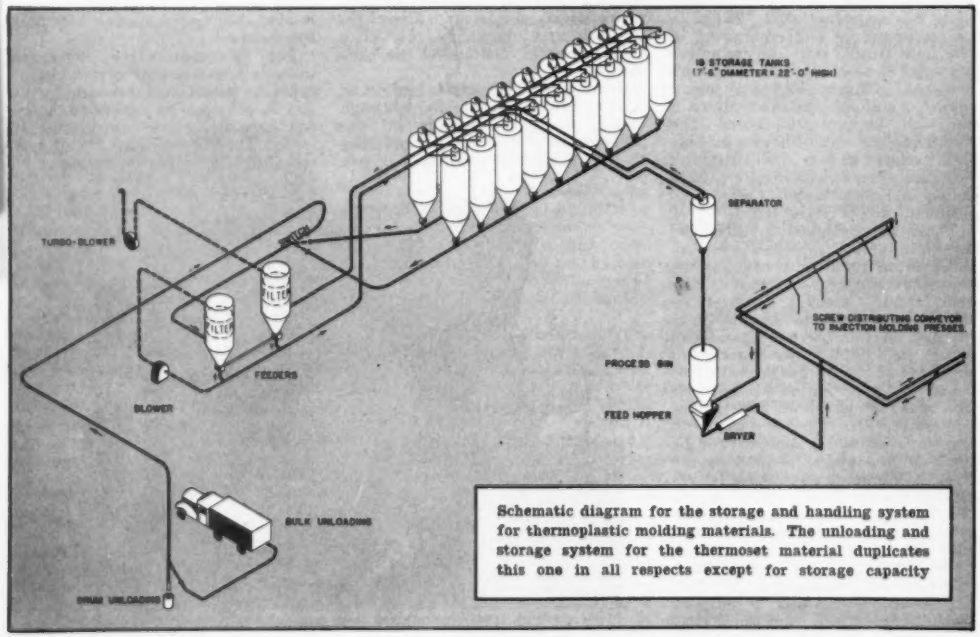
At the end of the system are these preform presses which receive plastic from the chutes shown at top of photo

pound arrangement. Material from the storage tanks is delivered as required to one process tank which is installed in an elevated position in the injection molding room. From this tank material is fed by automatically controlled flow into a rotary drum dryer.

The dryer in turn discharges material into a mechanical elevator for delivery to two enclosed overhead screw conveyor loops which supply the presses through small down spouts terminating at the press feeder screws. The screw conveyor loops include return runs which deliver excess material back to the dryer for redrying and recirculation.

Following is a brief description of the functioning of the pneumatic conveying systems and of some interesting design features incorporated in these installations.

Material is picked up under partial vacuum at the unloading station or from the outlet of a storage tank and travels to a combination receiver-filter located in the machinery house. The material is separated from the air at this point and is dropped into a pressure line by a motor-driven feeder-air lock. The air flows into an exhauster-blower which in turn discharges into the pressure line. Depending on the prevailing hookup of the pipe switches, the material is then delivered under pressure to a centrif-



Schematic diagram for the storage and handling system for thermoplastic molding materials. The unloading and storage system for the thermoset material duplicates this one in all respects except for storage capacity

ugal separator at the top of a tank.

The conveying air together with any material carryover is then returned under vacuum to the machinery house and flows into a second receiver-filter which separates the material and returns it to the distribution pressure piping through a motorized feeder-airlock. The air is drawn into and through the second filter by a turbo blower which discharges to the atmosphere.

All storage and process tanks are equipped with high level controls which operate signal lights and shut down the conveying machinery when a tank is full. In the case of the storage tanks the high level controls operate through a time delay which is set to give the unloaders several minutes for getting a storage tank completely full if so desired. Low level indicators provided on each of the process tanks are set to give the operators ample warning to refill the tanks before they become completely empty. The control panel for each of the two systems is located in the conveyor machinery shed.

Incorporated in these panels is a system of lights which indicate the prevailing hook up of conveying piping—that is, from receiving unloading to a particular storage tank or it may be from any one storage tank to one of the process tanks. These lights not only show the prevailing continuity in the piping hook up, but also indicate the electrical control continuity which must prevail before the conveying machinery can be started up.

Lights on the panels indicate whether material is flowing in the conveying system, a feature which is particularly useful in determining when a storage tank is empty. Each motor driven feeder on the outlet from a storage tank is controlled by a lock type switch on the control panels, and a light indicates when any particular feeder is in operation.

The outlet feeder control switch of a newly-filled tank is padlocked so that material cannot be withdrawn until it is inspected and ultimately released for production. The conveying systems are equipped with secondary protective devices which will shut them down in case of a plug-up due to failure in a high level tank control or in case excessive pressures are built up due to mechanical rather than electrical control failures.

These systems have given very satisfactory performance with a minimum of servicing. The factual savings and the improved production conditions obtained have equalled or exceeded all expectations.

Where There's Steam—There's Lockheed's Incinerator

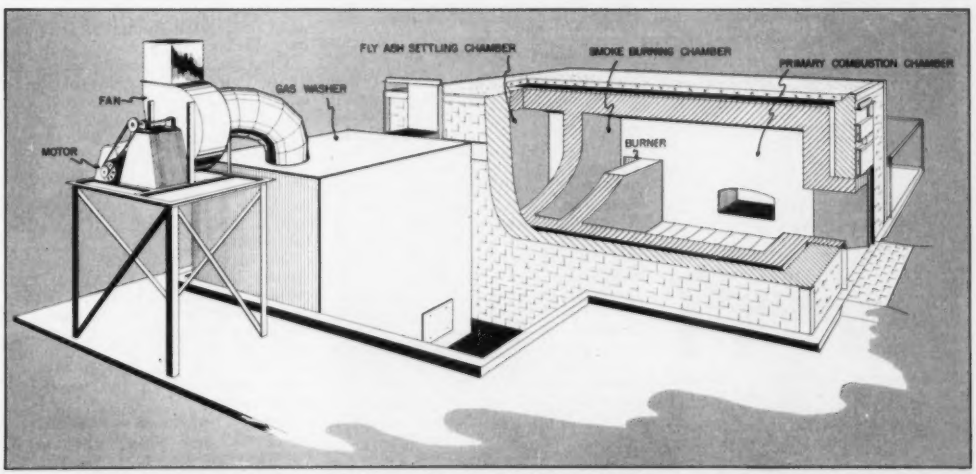
No smoke—only steam—is produced by Lockheed's new 700 lb per hour incinerator . . . Especially designed to destroy confidential papers, particularly blueprints, with zinc content, this new installation also takes care of tar paper, greasy rags, other smoke-making materials

LOCKHEED, at Burbank, never content with a back seat in equipment, product or processes, recently installed a waste-burning incinerator capable of consuming 700 lb of tar paper, greasy rags or other type of trash which ordinarily would fill the community with fumes and fly ash. This incinerator, however, gives off only a cloud of odorless, colorless, smokeless, smogless steam.

This new incinerator, built at a cost of almost $14,000, replaces an old silo-type burner that operated four hours daily. The new incinerator, located in the Salvage Area at Lockheed, is used primarily for destroying confidential papers, including discarded blueprints which contain zinc and are hard to burn.

Burning cycle employed in this incinerator is unique. Initial combustion takes place in the first chamber; in the second chamber high temperature gas flames reaching temperatures of 1200 to 1800 F destroy any fumes or combustible material remaining. The heated air and gases then pass into a fly-ash settling chamber and from there the gas goes into a spray-quenching chamber which reduces the temperature to approximately 350 F so that the induced draft fan may handle it without damage.

The new Lockheed incinerator was designed by American Incinerator Corp. especially for the job it performs for Lockheed. It operates 8 hours per day, and has a capacity of 700 lb of trash an hour.



Cross-sectional drawing of new incinerator and gas washer installed at Lockheed's aircraft plant in Burbank, California

Plant Engineering
Product Application Feature
PLASTIC VENEERS
LIKE DECALS . . . . .
Fine wood grains and rare and costly marbles are now available in plastic veneers . . . They can be applied to wood, metal or glass . . . All you do is select grain desired . . . Cut out necessary piece . . . Separate film from backing by dipping in water . . . Apply to surface . . . Then, remove excessive cement, water and air bubbles

Expensive Marble and Fine Wood Grains for Office, Furniture and Product Finishing

PLASTIC VENEERS of the finest wood grains, and the rarest and costliest marbles are available for refinishing office interiors and office and commercial fixtures. In order to develop the utmost in beauty and realism the logging and quarrying of these veneers has been done with a camera lens which has reproduced the most striking wood grains and marbles in full and natural colors.

In applying the plastic veneer, the material is placed in water until the film separates from the backing. After this, the film is laid on the cemented area. A rubber squeegee is then used to remove excessive cement, water and air bubbles. After it has set, surface is sponged with water and wiped clean

The products have been used for some time in industrial finishing of radio and TV cabinets, wall board and furniture but it is now available for refinishing and maintenance of all materials for industry or the home craftsman.

How to Apply It

Similar to the familiar decal this veneer has a protective paper backing which is removed by soaking in water, but unlike a decal the lacquer film transfer is cemented to the surface of the object being covered with a slow-setting cement. Many colors are used in each pattern to insure exactness of fit and fidelity of the re-creation. The pattern is printed face down and is not visible as the sheet arrives. On one side there is the opaque paper (which is removed) and on the other side a lacquer coating. Facing the paper is a clear lacquer coating and next comes the visible coat carrying the veneer design. When transferred, the pattern is face up but is protected by the heavy coat of clear lacquer.

Plastic veneer may be applied to wood, metal, glass or any other smooth sealed surface. Rough surfaces should first be properly prepared by filling in any indentations; the veneer clings to the surface tightly and if the surface is not perfectly smooth the imperfections will be accentuated.

If painted surfaces to which the veneer is to be applied are in good condition and not cracked or crazed it is not necessary to remove the old finish. However, all waxes, polishes or greases should be removed with benzine or a similar solvent.

Then the surface should be sanded lightly with a fine grade of sandpaper. Sanding eliminates dust that may have settled in old finish and is an added guarantee that the old wax or polish has been removed. For best results cover with a thin coat of varnish cut 50 per cent with turpentine; this is followed with a light sanding after the coat has dried thoroughly.

On surfaces that have not previously been finished apply a clear varnish coating as a sealer. Sandpaper the surface after the first coat has dried thoroughly, dust the surface with lint-free cloth and apply a second coat. Be sure to varnish under edges where the veneer is to be applied.

Use the cement as it comes from the bottle without dilution. Low temperatures thicken the cement, so, if surrounding temperatures are below 72 F, the cement container

Don't Tear Out Those Pages

Readers wishing tear sheets of any article appearing in the issue for their personal file may obtain them by indicating the item desired on one of the post cards appearing in this issue. — Editors

should be placed in warm water. It should then be shaken well and the cement swabbed liberally on the surface to be covered, using an acetate sponge.

To determine the pattern or direction of a grain place the paper-covered veneer in front of a strong light, paper side toward it. A straight edge and a single-edge razor blade are best tools for cutting to precise dimensions. It is important, the manufacturer warns, that cutting be done on the paper side and not on the side carrying the color.

After the material has been cut to the precise dimensions place the piece or pieces in water until the film separates from the paper. Then, remove the separated film from the water immediately. Some sheets of the veneer are too large for one man to handle accurately and an assistant is needed.

Next, the film is laid on the cemented area and moved into position with the palms of the hands. When the film has been positioned use a rubber squeegee lightly, working from the center out to remove excessive cement, water and air bubbles. Then, squeegee the surface more firmly but do not use excessive pressure. The film becomes set after drying overnight.

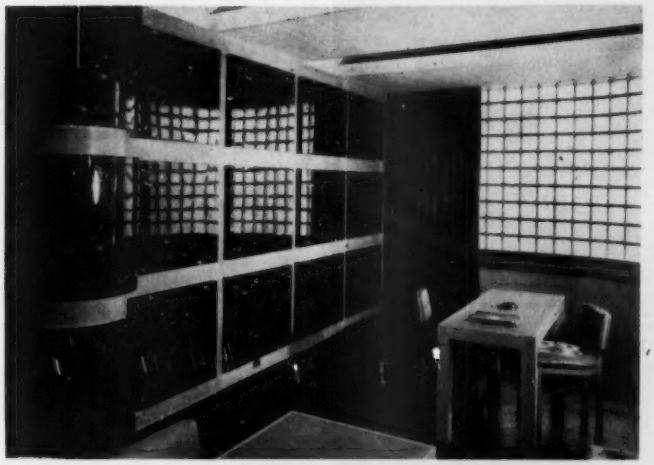
The next step, after the film has dried overnight, is to sponge it with warm water and wipe the entire area to free it of any possible remaining cement film. Let the film dry completely (about 48 hr) and then apply a protective coating.

Among the costly wood reproductions which are available in natural finish are: Italian olive burl, mahogany crotch, walnut crotch, blond or gray harewood, bleached or toasted mahogany, Macassar ebony, prima vera, French rosewood, satinwood, zebrawood, and many others. In the marbles, there are eight recreations available, from verdi antique to breche rose.

The industrial sheets are in sizes up to 34 by 50 in. A line key print on the back of each sheet marks the center of the sheet running the length and the width. This is helpful when cutting small pieces.

Want More Information?

If you do, simply write "Plastic Veneer" on one of the postage-paid cards elsewhere in this issue, and mail it.



Operation and Maintenance of AIR COMPRESSORS

Stuffing box gland nuts should be tightened evenly while the compressor is running, enough to prevent air leakage

Beginning where it should, with the air intake, this article reviews proper practice and procedure in maintenance and operation of air compressors . . . Intake piping . . . Piping and valves . . . Lubrication of air compressors . . . Proper care of falt and V-belt drives . . . Checking and cleaning air valves . . . Care and adjustment of bearings . . . Stuffing boxes, packing

MOST PLANTS EMPLOY compressed air to some degree, and in many it is an important source of operating power. For this reason, it is essential that the machinery and equipment furnishing the supply of compressed air be given intelligent maintenance on a regular periodic basis.

Of course, no compressed air plant can perform with high efficiency unless it has been properly planned and installed. It is therefore advisable, wherever operating difficulties are experienced, to check all phases of the installation against the equipment manufacturer's recommendations. Where serious faults are found, and it is certain that their correction will produce sufficiently justifiable results, it is well to make such changes as are necessary.

Intake Piping

Beginning with the air intake: This should be located outside the building and above the ground, and arranged so that any nearby discharges of steam, gas, dust, water or chemical fumes cannot be blown or drawn into the intake. Certain vapors drawn into the compressor might cause a serious explosion. The intake should also be protected from rain, and a suitable filter should be installed to prevent dust or other abrasive material from reaching the compressor cylinder, where it would cause rapid wear of the cylinder and piston and would promote the formation of carbon deposits on the valves.

It is important that the intake air temperature be as low as possible. The lower the temperature the greater will be the quantity of air delivered to the air-consuming tools and equipment.

Intake piping should be arranged so that any moisture collecting in the piping may be drained off before it is drawn into the compressor cylinder. Moisture entering the cylinder will wash away the cylinder lubricant, and if in sufficient quantity may cause breakage of parts.

Where it is impossible to prevent contamination of the intake air with acid fumes, the compressor manufacturer should be consulted with a view to making provisions to prevent corrosion of compressor parts.

Starting at the compressor intake connection, the intake pipe should be at least this size, and it is advisable to increase it one pipe size for each 10 ft of length. Low intake pipe air velocity reduces friction and consequent pressure loss, and tends to reduce air pulsations. The intake pipe should be as short and direct as possible and necessary bends should be made with long radius elbows.

In installations where more than one compressor is served by a single intake pipe, the cross-sectional area of the main pipe must equal, and preferably exceed, the combined areas of all the individual intake pipes.

The compressor discharge pipe should be as short as possible, and here, too, long radius elbows should be employed. If the air receiver can be placed outside the building it will radiate some of the heat contained in the compressed air, but the safety valve and pressure gauge should be placed inside the building, to prevent freezing due to cold weather.

The safety valve should be test discharged at frequent regular intervals by raising the air pressure to the blowing-off point. At the same time drain the receiver of any accumulations of oil and water. An accumulation of oil in the receiver may cause an oil vapor explosion. A suitable trap may be employed to automatically drain the receiver.

Piping, Valves

All piping should be well supported, especially that connected to the cylinder, to eliminate the danger of strain. Flange gaskets in the discharge piping should be made of an oil proof material, preferably asbestos, to withstand the effects of oil suspended in the air.

Flanges or unions should be provided in all pipe lines near the compressor, so that the various parts may be removed readily, if necessary, with minimum piping disturbance.

In most installations it is advisable to provide an aftercooler in the discharge line between the compressor and the receiver, as near the compressor as possible. The aftercooler cools the compressed air and thus causes the moisture it contains to separate from it and collect in a separator, from which it is drained manually at regular periods, or automatically by means of an automatic moisture trap. This helps eliminate water hammer, freezing of pipes and valves, and the washing away of the lubricant in the air-operated equipment.

Whenever any type of valve,

whether shutoff or check, is installed in the discharge line, a safety valve must be placed between the valve and the compressor, to prevent an accident in the event any of these valves are in closed position while the compressor is running. The safety valve should be set to operate at 10 per cent above normal operating pressure. This safety valve, too, should be test discharged at regular intervals.

Cylinder cooling water should enter the jacket at the bottom and leave at the top. It should be cool, clean and free from sediment. Dirty cooling water will deposit mud in the cylinder jacket and interfere with proper cooling. This will cause excessive heating of the valves and result in carbon deposits and consequent valve leakage. Heating may also damage the cylinder and piston, and will cause hard baked mud deposits in the water passages.

A valve should be installed on only the inlet to the cylinder water jacket, to control the flow of cooling water. The water outlet may be either free flow into an open pipe end or funnel, or the water may circulate in a closed circuit and be used elsewhere after passing through the cylinder jacket. The water pressure in the jacket must never exceed that recommended by the compressor manufacturer for the particular size cylinder employed. For this reason, a valve should never be installed in the jacket outlet piping.

The temperature of the water flowing from the jacket outlet should be approximately 100 F. A thermometer in the outlet line will indicate the water temperature conveniently. Where the compressor is provided with an intercooler between high and low pressure cylinders, the end of the intercooler connecting with the high pressure cylinder should feel cool.

When the cooling water is cold it is usually necessary to have the water inlet valve partly closed. A smaller bypass line around the inlet valve is preferable, since it permits better water flow regulation under such conditions and helps prevent wire-drawing of the main inlet valve.

If too low a temperature of water is permitted to flow through the cylinder jacket, condensation of moisture from the intake air in the cylinder will occur and the lubrication will be washed away, resulting in unnecessary wear.

When the compressor is shut down the jacket and intercooler cooling water should be shut off, to prevent the formation of moisture on the cylinder walls with consequent destruction of cylinder bore polish. In freezing temperatures the water must be thoroughly drained from the cylinder jacket and intercooler and aftercooler to prevent damage to these parts.

When the compressor is running, keep the piston rod packing sufficiently tight, but not tight enough to cause excessive friction or score the rod.

The proper crank case oil level should be constantly maintained, using a high grade motor oil, clean and free from moisture (SAE 30 or SAE 40. For freezing temperatures SAE 20 should be used). The same oil employed in the air cylinder of the compressor may be used instead. Generally, the crankcase oil need not be changed more often than once a month. The oil should be replenished from time to time, and occasionally drained and filtered.

The best grade of air cylinder oil should be used in the force feed lubricator feeding the cylinder. There are several types of air cylinder oils available. Some are high grade straight mineral oils; others are chemically fortified to resist oxidation, rust or sludge formation.

The minimum quantity of oil that will adequately lubricate the cylinder working parts, maintain the film of oil necessary to insure a satisfactory piston ring seal, and protect the valve parts from rusting and pitting should be fed to the air cylinder, since excess oil forms carbon deposits on the valves and causes them to leak, resulting in excessive cylinder temperatures. Improper and excessive lubrication may also cause an explosion in the air cylinder, discharge line or the receiver. The recommendations of the compressor or oil manufacturer should be followed as to the quantity of air cylinder oil to be employed for a particular size of cylinder.

Care in Lubrication

Generally, after one-day shutdowns of the compressor the force feed cylinder lubricator should be pumped a few strokes by hand before starting the compressor. This is usually not necessary after shorter shut-down periods, however, but the crank case oil level should be checked daily, as well as the operation of the force feed lubrication system.

Where an oil filter is used with the compressor lubrication system, after every hundred hours of operation, the sludge should be drained from the bottom of the filter. Air pressure applied to the top of the filter may be used to help blow out the sludge. In some types the filtering element can be removed for cleaning.

The compressor crank case should be drained after every five hundred hours of operation, under normal conditions. Where conditions are unusually favorable this period may be lengthened; where unfavorable, it may require shortening. Examination of the condition of the oil will indicate how often it should be changed. But it should be remembered oil is cheaper than repairs.

When the oil is drained, disconnect the oil strainer in the bottom of the crank case and clean it. Wash out the crank case thoroughly with kerosene and wipe dry with clean cloths, then refill the crank case with fresh oil.

Care of Belting

Where a flat leather belt drive is employed, use a belt half an inch narrower than the face of the belt-wheel and do not tighten it more than is necessary to prevent slipping. Excessive tightening may overload the compressor and motor bearings and damage them.

The belt should be kept pliable in

Removing valves cover. When valves need cleaning, soak them overnight, if possible, in mineral spirits and then brush them clean with a soft wire brush

order to wrap uniformly over the pulley faces. If it becomes even slightly dry, clean it with a cloth dampened with kerosene, then apply a light coat of belt dressing to both sides of the belt. Repeat the dressing applications, allowing the dressing to penetrate the leather completely after each application, until the leather is pliable but not greasy.

If a belt idler is used, the bearing and hinge grease cups or lubricators should be checked at regular intervals to insure proper lubrication.

Where a V-belt drive is employed, keep the belts just tight enough to prevent slippage under full load. Excessive tension will damage the bearings of both the compressor and the motor.

V-belts should be protected from oil and temperatures above 130 F. Do not apply belt dressing. V-belts should be replaced, when necessary, with a complete new set. New belts when operated with old belts will be forced to carry most of the load and their life will thus be shortened. However, any of the old belts still in serviceable condition may be kept for emergency use on future replacements. Keep spare belts in a cool, dry, dark place.

V-belt sheaves that are badly worn in the grooves or are chipped should be replaced, as they will cause excessive belt wear.

Motor Drive

Compressor drive motors require the same care and maintenance as other motors. The bearing lubrication should be checked at regular intervals, and any brushes employed should be kept clean and free-moving so that they will provide good electrical contact, and when worn down should be replaced. The bearing housings should be cleaned of old lubricant, flushed and replenished with fresh lubricant at regular intervals, usually from six months to two years, depending upon type of bearing and operating conditions.

Motors, too, should be kept completely clean. This is best accomplished with medium pressure compressed air. A cloth moistened with mineral spirits can be used to remove greasy or oily deposits.

Check the Valves

Examine the cylinder air valves for valve and spring wear, damaged parts, carbon formation, etc. The presence of deposits on the valves indicates dirt in the intake air, excessive quantities of cylinder lubrication oil or improper grade, or high air temperature, due to inadequate jacket water cooling or leakage of the valves themselves.

The valves can usually be cleaned without taking them apart. If possible, soak them overnight in mineral spirits and then brush carefully with a soft wire brush, but use a bristle brush on all seating surfaces. Rinse the valve in mineral spirits and blow it off with compressed air to remove all dirt particles.

If more than one valve assembly is removed at a time, mark each with an identifying mark so as to know its proper location when replacing it, because each valve assembly must be returned to the opening from which it was removed.

Where unloader diaphragms are employed, check these for wear or damage and replace if necessary.

If the valve seats are found to be worn they should be refaced and new valve parts installed. Valve seat refacing can be done either by the owner or at the factory.

Check the valve passages, also, for deposits of carbon or gummy oil and remove any found.

Where an oil cooler is employed, clean it at this time by removing it and washing it in kerosene to remove any sediment. If scale is found in the tubes, clean them by pushing a wire brush through them.

If at periodic inspections of the compressor it is found that wear has developed in one or more of the operating parts, corrections should be made in accordance with the specific instructions furnished by the manufacturer.

Bearing Care

Some compressors are equipped with adjustable tapered roller main bearings which may, under unusual operating conditions, require adjustment. Usually it is necessary to first remove the wheel at the bearing requiring adjustment. To do this, the split wheel hub is spread open as shown in Fig. 1, thus loosening the hub on the shaft.

The bearing side cover, gasket and bearing cap are then removed and the adjusting nut clamp bolt loosened, so that the nut can be turned by placing a steel bar against the notches in the nut and striking the bar end moderately with a hammer. The nut is turned just enough to eliminate bearing end play yet permit the compressor to be turned over quietly and freely by hand.

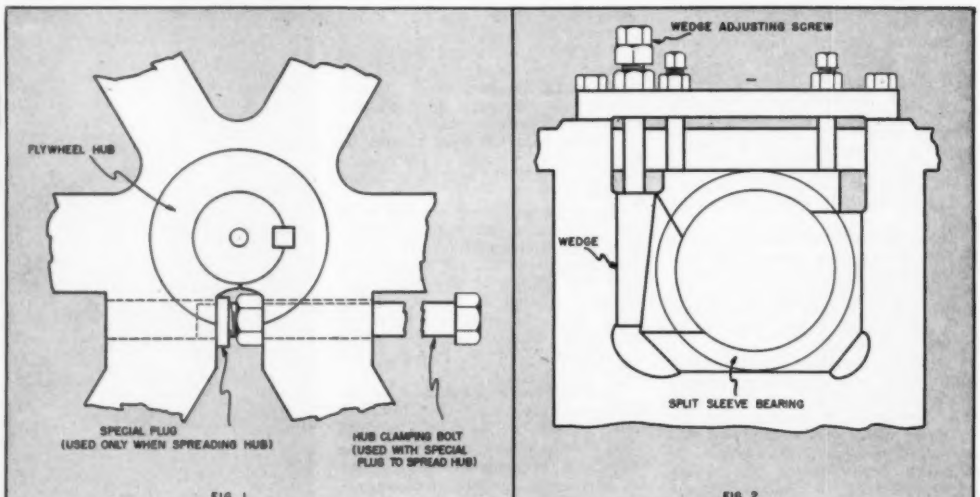


Fig. 1. Left: When it is necessary to adjust tapered roller main bearings it may be necessary to remove the split-wheel hub as above. Fig. 2. Bearing sleeves are generally in three sections arranged so that pressure will permit take up in all directions

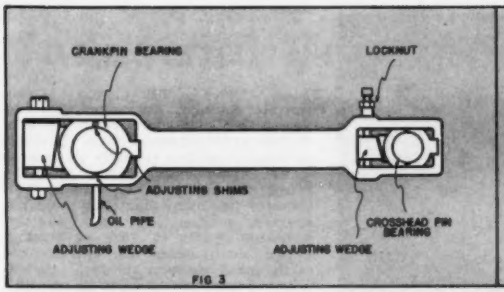


FIG 3

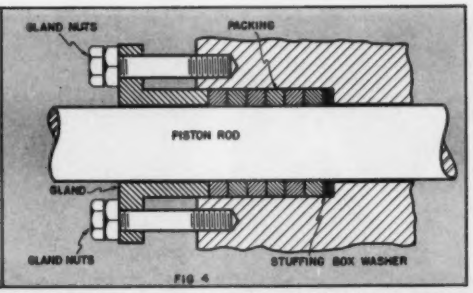


FIG 4

Fig. 3. Left: Crank pin bearings, in some cases, are provided with shims between the two halves of the bearing sleeve. They are designed to retain lubricating oil and permit adjustment in wear. Fig. 4. Right: To prepare for repacking of air cylinder stuffing box, the gland nuts must be removed in order to permit the gland to be slid free of the stuffing box

If it becomes necessary to remove the roller bearings, the crankshaft is first removed from the frame. The bearings may then be removed with a suitable type of bearing puller.

When replacing roller bearings they should be heated in hot oil, but the temperature of the oil should not exceed 275 F.

Where compressors are equipped with sleeve bearings the manufacturer's instructions should be followed in making adjustments. The bearing sleeves of the larger bearings generally consist of three sections, Fig. 2, arranged so that pressure from wedges and adjusting bolts permits takeup in all directions.

Usually this type of bearing is first brought up tight and even against the shaft, then backed away evenly a little, the adjusting bolts locked, and the compressor operated for a while. If the bearing fails to become quiet after a couple of hours, the adjusting screws are tightened very slightly and the compressor again operated. This procedure is repeated until the bearing runs quiet. Operating a compressor with the bearings tightened too much may result in bearing burnout.

If it becomes necessary to inspect or renew sleeve bearings, generally the bearing caps are removed and the adjusting screws loosened, and the oil ring (if one is used) is moved along the shaft. By jacking the shaft up just enough to remove pressure from the bearing sleeve, the sleeve sections can be removed.

The bearings of the connecting rod are usually arranged for takeup by means of adjustable wedges. On one type of compressor, as shown in Fig. 3, the crank pin bearing is provided with shims between the two halves of the bearing sleeve, for the purpose of retaining lubricating oil in the bearing. These shims are made up of 0.002 in. thick laminations. When it is necessary to take up the bearing to compensate for wear, the proper number of laminations are removed equally from both shims to leave a running clearance of 0.003 in. in the bearing, after the adjusting wedge is tightened.

The crosshead pin bearing on this type connecting rod is taken up by tightening the wedge until the bearing grips the crosshead pin, then backing off the wedge set screw one-quarter turn and tapping the set screw to free the wedge. This automatically provides the correct running clearance.

When necessary to inspect or renew the connecting rod bearings, either can generally be removed without removing the connecting rod from the compressor. The crank pin bearing can be removed after the adjusting wedge has been removed and the crank turned so as to free the two halves of the bearing. Removal of the crosshead pin bearing requires not only removal of the adjusting wedge but also removal of the crosshead pin.

After several adjustments of the connecting rod bearings, the piston travel clearances in the air cylinder should be checked in accordance with the compressor manufacturer's instructions and any needed adjustments made.

Some compressors employ a solid crosshead pin bearing in the connecting rod instead of an adjustable split type bearing. When pin clearance becomes excessive from wear, the bearing must be replaced.

The crosshead is usually arranged for compensation for wear. In some types the top and bottom shoes are wedge-adjusted. In moving the shoe surfaces outward to take up wear, be sure to allow enough running clearance (about 0.008 in.) to prevent heating of the shoes.

On some crossheads having only one wearing shoe, compensation for shoe wear can be made by inserting a thin liner shim between the shoe and the crosshead casting. The crosshead guide bars can be lowered, to compensate for wear between the crosshead and the guide bars, by removing enough adjusting shims to provide a running clearance of 0.004 in. to 0.007 in., minimum.

If wear develops between the piston and the cylinder wall, thus lowering the piston, the crosshead should be lowered accordingly in order to maintain the original alignment. This is accomplished by moving the bottom crosshead shoe inward to lower the crosshead and the top shoe outward to provide proper running clearance.

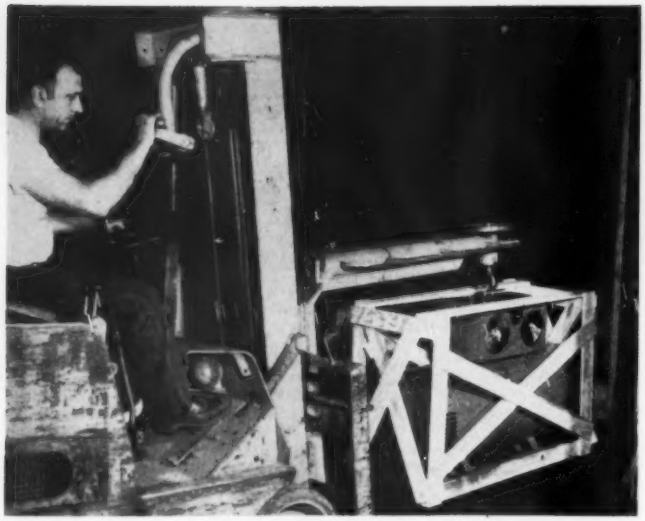
To check the accuracy of this adjustment, turn the compressor over by hand and test the trueness of piston rod travel with an indicator.

The air cylinder stuffing box gland nuts should be tightened evenly, while the compressor is running, just sufficiently to prevent leakage of air. Excessive tightening causes undue friction, packing wear and possible rod damage. If after the gland nuts have been pulled up lightly air still escapes, the box requires repacking. This is done by removing the gland nuts, Fig. 4, and sliding the gland free of the stuffing box. Then remove the old packing, carefully employing packing hooks if necessary.

After all old packing is removed and the stuffing box and piston rod are free of packing particles, see that the box washer is in place at the inner end of the box. Then dip each ring of packing into clean crank case oil and insert it into the box, pushing it into place. The joints of all rings must be staggered. Replace the gland and tighten the gland nuts evenly until snug. Then back off the nuts and retighten them with the fingers.

(Continued on page 200)

Bearings on connecting rods usually are built for takeup by adjustable wedges



Operator using positioning device designed and built by Lincoln Electric for use on an industrial truck. Loading of freight cars was formerly a two-man operation but one man has been released for other duties because the operator can, by manipulating the hand controls, position the crate exactly where he wants it. The positioning device also enables the operator to easily make sharp, right-angle turns

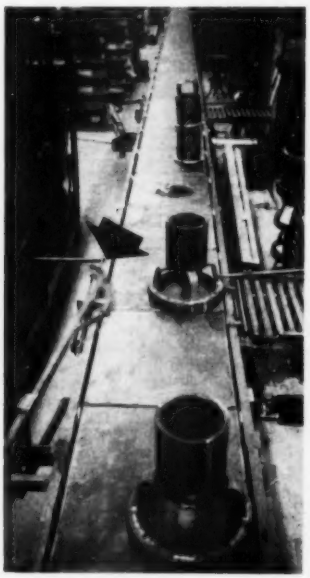
They Engineer Their MH Equipment at Lincoln

LINCOLN ELECTRIC'S "factory in a storeroom" got that way largely because of good plant engineering and excellent engineering of the materials handling equipment and its relationship to plant and layout.

Industrial trucks are used in aisles at the ends of the pallet-type conveyors (lower right). The building was designed and laid out so that overhead handling could be used extensively in the production bays. This policy resulted in the reduction from a possible 10 ft aisle width (if trucks had been used in the aisles) to 7 ft. Lincoln estimates a savings of 20 per cent of their floor space through proper application of trucks and conveyors.

The conveyors are used to move material from the receiving end of the building into the bays; they may also move material from one work station to another within the same bay, and from work stations in the bays to the ends of the bay. Here the materials, finished or semi-processed, are moved to shipping or to other bays by industrial trucks. The combination has played a big part in Lincoln's exceptionally economical operation.

Photograph at the right shows the automatic take-off on the bracket line conveyor. This take-off is air operated and is actuated by the bracket which is so positioned as to bump a pin on the right hand side of the conveyor. Arrow shows the air-operated arm moving into position to push the bracket down the inclined conveyor



Shown below is Lincoln's famous truck-loading C-hook. This device picks welders off the roll-down conveyor coming from the paint booth. The hook can pick up a 4,000 lb load and position it any place inside a 28-ft truck body. The hook travels slightly faster than 300 fpm. Photo also shows leveling docks which were designed and built by Lincoln at the time the plant was being built

Industrial Ventilating and Heating—

They're Tied Together When You Consider Economy

A general exposition of the things so many of us should know about heating, ventilating, exhaust fans, equipment and its application . . . The author covers the field from establishment of a preventive maintenance program to the problems of unbalanced air income and outgo

By R. M. FRANCIS, Plant Engineer

STEAM FOR HEATING requirements of some plants in large cities are served by central systems. If your plant has one of these, you're relieved of a lot of headaches. However, since these cases are very much in the minority, a few general comments on boiler plants are usually of interest to most plant engineers.

Due to present-day limitations on fuel supply, the insurance value of a dual, or even triple, source of fuel is extremely important. If boilers can be equipped to burn coal, oil, and gas — or any combination of these — the ultimate in steam supply continuity is assured. (The fuels must be available in the area, of course.)

Some form of feedwater treatment is a "must"—even in the smallest boiler plant. Proper treatment can be prescribed after an analysis of the raw water has been made. Numerous companies make a business of furnishing this service; and it is best not to gamble on uncertain treatment.

A well-studied preventive-maintenance program should be initiated when a plant is first put into operation, and rigidly followed thereafter. Such a program should include not only the obvious points such as lubrication, valve repacking, boiler tube cleaning, etc., but should also encompass routine inspection and repair of all internal components of boilers, pumps, fans, condensers, and other associated equipment. Records should be kept of all such inspections, and also of the maintenance work performed as a result thereof. (These records form a valuable "case-history" of the plant, for future reference.)

Good housekeeping pays off in the boiler house more than most any other part of an industrial plant; this is hard to realize, but is quite true. The deteriorating effect of sulphur in fuels, plus the rust caused by excessive moisture, are only two of the elements which necessitate extremely good housekeeping.

Efficiency of a boiler plant can be maintained only when attention is given to the prevention of steam leaks, loss of heat due to faulty pipe covering, etc. Dozens of small leaks can total up to a lot of pounds of steam per hour; also, thousands of BTU's can be dissipated through a comparatively small footage of uninsulated steam piping. Faulty pump packings might not cause an expensive waste of water, but they can contribute a lot toward miserable housekeeping.

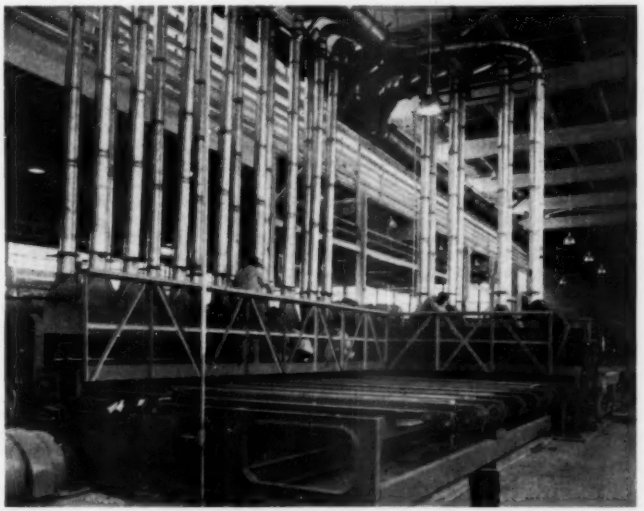
Many small steam plants do not meter the steam generated, or that consumed by the various departments of the plant. This is a mistake, and is being penny-wise and pound-foolish. Without meters, no attempt can be made to attain the maximum efficiency possible.

A careful labor analysis should be made to determine the necessity for each employee involved. (An example of increased economy is always portrayed convincingly when a small boiler plant is converted from coal to oil. Immediately upon making the conversion, all employees formerly engaged in fuel and ash handling can be transferred to other work.) Make the simple test of determining whether automatic equipment can practically and economically eliminate manual labor. The cost of such labor-saving equipment can be liquidated in a reasonable number of years, and will thereafter contribute materially to the efficiency of the plant.

Good lighting, painting, and ventilation are necessary to good plant operation, although the plant will probably function without them. Schematic piping and wiring plans —framed under glass, and displayed in conspicuous places—lend an air of efficiency, and prove invaluable in times of emergency.

Don't overlook the smoke-stack! Just because it's standing up in the air, and is rather inaccessible for routine inspections, don't take it for granted. An annual inspection will bring out the danger warnings and indicate required maintenance procedures to be followed at a later, planned, shutdown period.

Considerable maintenance expense and extensive down time of pumps



A good example of sheet metal work in exhaust systems. This photo was taken at the material exit end of the saw which trims fiberboard sheets at new plant of Armstrong Cork Co., Macon, Ga. Pipes leading from the saw carry off sawdust

Photo: The Austin Company

Plating tanks at the A. B. Dick Company plant have well-engineered exhaust hoods designed for maximum protection of workers and for minimum heat loss

and fans can be effected through the use of "sprayed-metal welding" for worn shaft rebuilding. These worn shafts can be built up to oversize, then turned down to exact size. This saves cost of returning to a manufacturer's service shop, and subsequent rebalancing. (Generally, the cost of this equipment can be saved in one year's time.)

Selection of Heating Equipment

As a general rule, the types of buildings, or the kind of operation—or both — determine the type of heating equipment to be installed. Offices, because of their size and styling requirements, can be best heated with direct radiation or forced warm air; the latter fitting itself into a complete air-conditioning system, if desired.

Conventional direct radiation can be of free-standing or wall-type cast-iron; or, it might be of the convector-type. The latter has many advantages in its favor, although the first cost is higher.

Radiant heat has gained tremendous popularity in recent years, especially in one-story plant buildings. This principle of heat distribution is sound, but there are installation and maintenance problems yet to be worked out. (Winter de-icing of sidewalks has utilized the same principle satisfactorily for some time.)

General factory building areas can be heated with any of the five types mentioned above, or combinations of them. In addition, unit-heaters are applicable to certain types of operations. Personnel complaints result from improper applications of these units, however, and careful study must be given to their location. A specific use for unit-heaters is in supplying a hot air blast to loading doors which must remain open a lot in cold weather. Another is for the heating to high-boy buildings, warehouses, and similar structures.

In any type of heating some method of heat control should be installed. This should be applied by zones, or areas, preferably. Surveys taken before and after the installation of heat control systems show resultant savings of as high as 50 per cent, or better, in annual heating costs.

Spot-heating, such as unit-heaters, can be controlled locally by individual thermostats; however, general heating systems require more than one point of control. This is usually attained by "zoning" the system according to geographical location; that is, using one control point for the north and east radiation, and one for the south and west. Most control systems consist of a pneumatically, or electrically-operated valve, plus a pilot radiator, and necessary controls. A good system incorporates both inside and outside thermostats, plus a control device for balancing the two. In this way, changing weather conditions will be compensated for, to prevent time lags in fluctuating the heat supply.

Needless to say, these control systems are custom-tailored for each application, but the manufacturers can furnish them to suit any set of conditions. One word of caution: be sure the system you select does not modulate the steam valve on too short a time cycle, as the resultant shock to the boiler plant might be very disturbing. In plants of any size, which are not equipped with heat controls, sufficient savings can be made in heat loss to justify the services of a full-time man to do nothing but control heat to all parts of the plant. This is especially true in the peak winter months.

Plants using any amount of high-pressure process steam can utilize the flash steam in the condensate lines to heat the buildings. This can be accomplished through the use of flash tanks. And, in plants employing high, medium, and low-pressure steam, a triple usage can be made of the initial supply. A cascade-flash-tank hook-up can be utilized. All of the condensate is returned to the boilers, after the usable heat has been expended.

Steam traps should receive regular inspections and preventive maintenance, as this program can be a big money-saver. Generally, traps are forgotten, after once installed. This is bad practice, as the steam escaping through traps is definitely a waste. Traps should be standardized, and should be simple, and easy to maintain.

Plants using large amounts of heat (in any form), as part of their process, should be studied for waste-heat utilization. Chances are, some type of heat-exchanger can be devised to make good use of the waste heat. Cement plants have long used the waste heat from their kilns to produce steam—through secondary boilers. But—there are many plants using ovens of various types, which might well find a way to utilize the waste heat generated.

Aside from the refrigeration phase of air-conditioning (which is, in itself, a broad subject), there are many angles to the ventilating systems of the average plant.

Plant Ventilation

The simplest of ventilating systems appears in every plant: some type of fan—or fans. Wall fans are for small areas, and should not be expected to cool off an auditorium. General areas can, in most cases, be given a fairly good distribution of air movement with the application of pedestal fans; 24 in. blades, of proper design, move a large volume of air in a reasonably quiet manner. And, if properly placed, a few such fans can provide comfort to a lot of employees, in hot summer weather.

Exhaust fans, in one form or another, remove heat, dust, fumes, and many other air-borne elements not wanted in a plant. That's elemental, but too often the selection of such a fan is based on the mere opening of a catalog to the page which shows the right size—at the cheapest price. There are many considerations in the proper selection of exhaust fans other than price and size. Consider such factors as speed, noise, reversibility, hours of operation, corrosion protection, type of bearings, stand-

(Continued on page 198)

WHO WILL WIN THESE PRIZES?

Plant Engineer W. F. Koester, center, of the West Allis Works, Allis-Chalmers Manufacturing Company, discusses the PLANgineering Contest announcement with two members of the works engineering staff, Fred A. Bermke, left, and Alfred H. Leja, right, assistant plant engineers

The entries for the first monthly PLANgineering Contest are in the hands of the judges. It's "open season" on the $200.00 prize money in the July Contest

First Prize	$100.00
Second Prize	$ 50.00
Third Prize	$ 25.00
Fourth Prize	$ 25.00

In case of a tie, duplicate prizes will be awarded

The July PLANgineering Contest is now open

For your chance at the prizes:—

Send your Production, Maintenance or Operation idea, with photographs or sketches to illustrate it, to PLANT ENGINEERING's Contest Editor—the judges will do the rest

RULES OF CONTEST

1. Entries must not exceed 500 words in length.

2. Entries will be judged on basis of originality of idea, on how generally the idea may be applied to other plants, and on the time and money-saving possibilities inherent in the idea.

3. All entries, whether prize winners or not, will be paid for if they are published in PLANT ENGINEERING.

4. Deadline for entries in the July Contest is May 25th; entries received between May 25th and June 25th automatically enter the August contest; etc.

5. Final contest will be November unless notice is given to the contrary.

6. No consideration will be given to entries which have been published elsewhere.

7. Judges of the contest will be three members of the Plant Engineers Club of Chicago; their decision will be final.

8. Send entries to: Contest Editor, PLANT ENGINEERING, 110 So. Dearborn St., Chicago, 3, Ill.

Hedstrom Built Its Business First, Then It Designed the Plant

Knowing the company's product, processes, suppliers and customers Hedstrom Union built its plant around the specifications that these necessary ingredients spelled out . . . Clever utilization of floor space which meant putting the product washing facilities and the bake oven on the plant roof, added efficiency to an already efficient plant

By JOHN CONTI, General Manager, and R. A. HEDSTROM, Asst. General Manager, Hedstrom Union Company, Dothan, Alabama, Plant

OUR BUSINESS throughout the South was already established. The problem was to design an efficient plant to provide wheel goods for the South; to be supplied by the South, and to be located advantageously within that area.

Long before it was known where the plant would be built, a quarter-inch-to-the-foot scale model was developed with the proposed machinery and equipment blocked in. Certain decisions had to be made before the scale model was erected.

The "home" plant in Fitchburg, Mass., was four stories high. Advantages and disadvantages of such a plant were known. It was believed that an area in the South could be found where land would not be at such a premium as in Fitchburg. If there were sufficient area to spread in, then a one-floor plant offered some advantages: streamlined production on one floor would provide for a better flow of materials; with more elbow room, a more flexible and efficient materials flow could be planned; all plant production could be put on a conveyor system; and labor time and handling costs reduced.

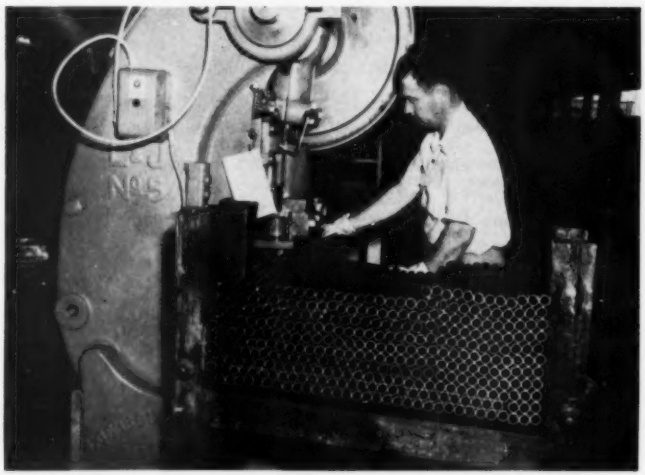
As such a one-floor plant was decided upon, the flow and the conveyor set-up was planned in advance and of course, in accordance with the space requirements of equipment and machinery to be installed.

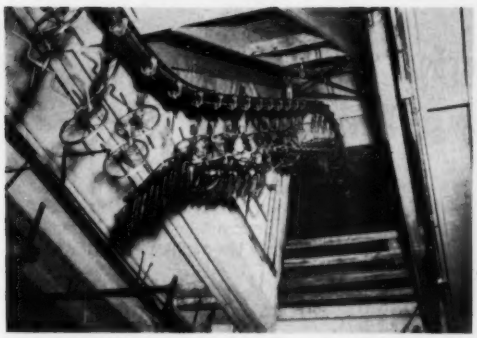
Having determined what kind of a plant would be built, a survey was made to select the general area. The market for wheel goods in the South was known and being served by the Fitchburg plant; competitive advantages of a southern-based plant had been sketched; the product to be manufactured was known and no new products were under consideration. Over thirty cities in the general area were surveyed before final selection was made.

Some of the major points included in these surveys were: the location of the steel supply; the location with reference to the center of the sales area; freight rate points coming in and going out of the cities surveyed; supply and shipment of containers and corrugated boxes; comparative power rates, gas rates, fuel rates, and construction costs.

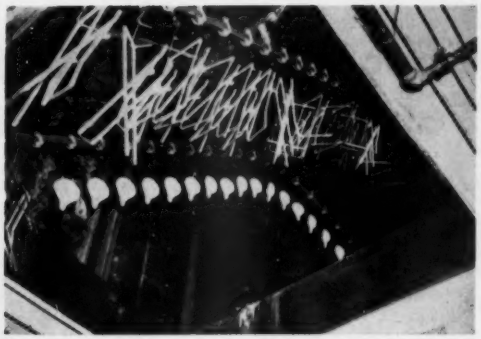
Decision to build in Dothan placed the plant between Birmingham, Alabama and Atlanta, Georgia, two

Tube bending operation in which straight pieces of tubing are bent to the proper angle to become the main framework of the company's end product "Trike"





Tricycle wheels and frames moving along the overhead conveyor to the washer on roof where they receive steam-chemical bath to remove foreign matter. After special rinse, parts return to production floor on same conveyor



Freshly painted sulky parts move into oven for baking process. Tricycle seats on lower conveyor have been baked and are leaving oven. Both oven and washer are located on the roof as indicated by the numbered arrows 1 and 2

sources of steel supply less than two hundred miles away. All steel for production comes from the South. Cloth, both fabric and coated, and corrugated boxes are brought in from the South, either by truck or by rail to the siding that runs the length of the new plant. The location also provides a good solution for the freight rate problem. Once the materials have arrived, all the necessary processing is done in the plant.

Four basic elements skied to the roof of the plant are keys to the Hedstrom-Union operation and efficiency. These are the crane, the washer, the oven and the conveyor to the warehouse.

The crane that unloads the trucks and railroad cars is also used to bring steel from the warehouse into the shearing operation. The crane moves outside on steelwork over the railroad siding but its entire run across the end of the plant is under housing built about one floor high on the roof. From the railroad siding it moves into and through the warehouse, then into the shearing department at one end of the manufacturing operation.

A great deal of space is saved by having the washer and oven on the roof. Not only is the production floor kept clear, but fumes and heat are kept out of the plant.

Both washer and oven are tied in with the operation by an overhead conveyor. Finished tricycle wheels and frames, for example, are hooked on the conveyor which carries them up through the washer on the roof where a steam-chemical bath cleanses them of foreign matter. Then the parts are carried downstairs through the drier and on to the paint department. After being dipped or sprayed, the conveyor carries the parts up on to the roof through the oven which is built in a wide "L" at one end to permit the conveyor to complete a circuit and return back through the same opening on a track parallel to the parts moving in. The centralized painting and baking is a Dothan improvement over the Fitchburg plant.

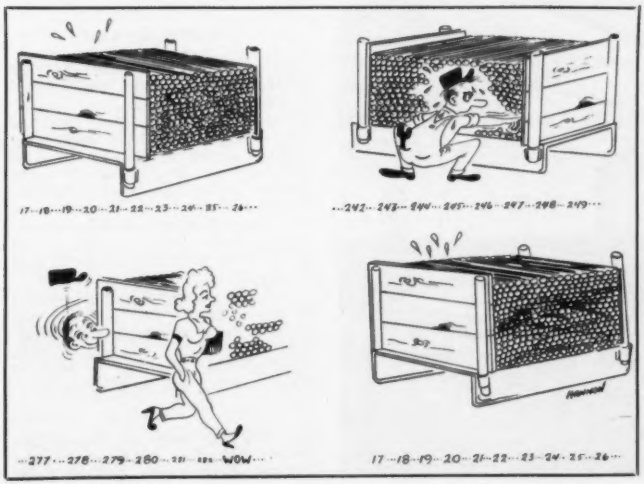
The housing for the washer and the oven can be seen in the air view of the plant. The washer, No. 1, is nearer the front of the building; the oven is No. 2; the long superstructure seen at the left, No. 3, houses the crane. The overhead structure, No. 4, between the two buildings, houses a belt conveyor which carries packed merchandise to the warehouse.

In the Dothan plant operation only packed products are sent to the warehouse. While the business has wide seasonal swings, the production is year-round and steady. The best use of machines and the avoidance of scratches, dictates a policy of holding completed parts until a certain number of complete assemblies are ready. Then the parts for a given number of a type of model are sent through the cleaning, painting and baking operations and back to the packing station in the plant. Here the component parts are packed, each model cartoned, and the sealed carton placed on a conveyor belt which carries it over the driveway to the warehouse.

The parts for many models and designs are held and packed at one place in the plant.

In the warehouse the packed wheel-goods are stored in separate sections; handled partly by roller-conveyor but chiefly by dolly. Orders are then made up from the packaged items; perhaps one package from one section; two from another section and ten packages from a third section.

The plant was set up as planned in Fitchburg, Mass., and while certain pieces of equipment then programmed are still being added, the processing and flow of materials in and out of the plant and in and out of Dothan have continued as visualized.



Choose the Right Light For the Plant Drafting Room

How to eliminate eye strain from close work . . . What the author considers an ideal lighting arrangement for the drafting room . . . You have your choice of troffers . . . Luminous indirect lighting . . . Or, wall-to-wall lighting . . . It's important to select the right light for the job

By **GEORGE P. WAKEFIELD**, Development Engineer,
The F. W. Wakefield Brass Co., Vermilion, Ohio

TO A GREATER extent than in other professions or trades light is one of the most important working tools of the engineer and draftsman. There are many lighting systems available on the market, and the final selection should be made after a thorough examination of the qualities of each. Several proved types of lighting are covered in this article. It is important that you choose the right light for your particular requirements.

Enough Light Not Enough

Like the dentist or surgeon, the man who operates at a drawing board recognizes that the amount of light is not enough. He must also have control over the direction of the light, often to avoid specular (reflected) glare and shadows. If he has studied the subject of accurate and comfortable seeing, he pays particular attention also to the surroundings or environment in which he works because of their important effect upon general seeing and the lighting of the job in hand.

An ideal office-drafting room would have outside windows on two sides, facing each other, with the light from the windows controlled by venetian blinds, preferably translucent blinds. Their texture and thickness would be such that, with bright sunlight on the outside, their inner surfaces would be slightly brighter than the walls of the room. Expressed in footlamberts, which measure comparative brightnesses, and not footcandles which measure the amount of light delivered at a given point, the inner surface of the blinds would measure about 150 ft-L in direct sunlight, the walls about 65 ft-L, thus avoiding violent contrasts. This would allow much light to come through the blinds. Why waste good free light?

The ceiling would be white, of about 80 per cent reflectance; the walls done in pastel shades of about 50 per cent to 60 per cent reflectance. The furniture, cabinets, dry printer, book shelves, and other furnishings would be in light blues throughout and the instruments would all be light colored with mat finishes. The floor would be in light coral, for warmth.

In such a working environment you would get the light you pay for since dark colors absorb light and don't release it again any more than blotting paper releases moisture. Much more important, however, there would be a minimum of direct and specular glare. Even pencil work on cloth would not bounce back too badly.

On that point there is one easy and sure cure for specularity of pencil lines, i.e, adjust the direction of the incident light away from the eyes, if practical, by the use of a near-vertical drawing board. As a test of specularity, draw a wide, solid pencil mark, and observe its reflectance as you shift it throughout your work zone.

With the exception of the window arrangement, the foregoing pretty well describes the author's drafting room.

This drafting room at Oldsmobile's Detroit plant uses suspended louvered lighting which gives grid of light

Lighting Systems

But let's examine the various lighting arrangements which could be used.

Unfortunately too many drafting rooms receive daylight from only one side or no daylight at all. Also sad but true is the fact that the amount of daylight is unpredictable during daylight hours. Therefore, we must have an electrical lighting system available, and hope that it will fit our ideal planning almost as well as daylight.

There are many lighting systems to choose from. The selection can go from the troffer type to the luminous indirect to the wall-to-wall lighting. The qualities of each of these systems will be discussed.

This suspended ceiling of light furnishes the same amount and quality of light throughout the room. Arrangement of drawing boards and desks is no problem

Troffers built into the ceiling can furnish a good quantity and quality of light if the location in relation to the task is right, so that the direction of the light at the task is controlled. The troffers should not be directly above the task. To avoid shadows, the drawing board and comparable surfaces should be so arranged that the light comes from right and left, as from the windows already mentioned. Other office equipment that does not require critical seeing can be placed anywhere, even next to the windows or directly under the luminaires in the brightest zone of the lighting.

These same principles apply generally to louvered bottom suspended lighting equipment. Since this type of lighting is hung from the ceiling, it is rather easy to predetermine your needs and have it hung where it will serve best. Too often drafting rooms are lighted to provide so-many footcandles, but with little thought to the basic needs of the draftsman. Visibility and comfort at the drafting task are paramount. The proper location of tasks and desks are important.

Luminous Indirect

Luminous indirect equipment is comparable to the translucent venetian blinds mentioned as the ideal source of daylight. Enough light penetrates through the translucent shield of a luminous indirect fixture to give it a brightness only slightly greater than the white ceiling beyond it. About 10 per cent of the light is transmitted directly downward through the shield while the remaining 90 per cent goes to the ceiling which then becomes a broad source of light without bright spots or consequent glare. This type gives freedom of office layout, since desks or drawing boards need not be placed to avoid glare.

A simple but effective test of the brightness of your fixtures is to place a mirror on your desk or board. If the overhead lighting stands out as glare spots (high brightness) it may mean that the bottom sides of the fixtures are too bright in comparison with the white ceiling beyond them. Bare fluorescent tubes overhead are examples of that. But it could mean that the ceiling is not white enough or that it is plain dirty. Shiny varnished surfaces on your equipment or furniture will make overly bright fixtures reflect painfully into sensitive eyes. So it is sensible to pay attention to the office equipment and do not immediately put all the blame for specular glare on your lighting. Many of the larger public service companies will test comparative brightnesses with a special device read in footlamberts.

Wall-to-Wall Lighting

The newly developed suspended luminous ceiling is one big translucent plastic luminaire of low brightness, furnishing the same amount and quality of light throughout the room, a ceiling of light with no area brighter than any other. Under such a uniform canopy the placement of drawing boards and desks is no problem since the light is the same from wall to wall. It is possible to wire such a ceiling to give different levels of light from dawn to daylight. Preference at this time seems to be in the 50 to 75 ft-c levels.

Some ceilings are available with light metal acoustical baffles. At least one of them is now being used in a third way, to distribute conditioned air introduced into the plenum chamber above it and forced downward through the interstices of the corrugated plastic. Thus, it gives as broad, uniform, and draftless air distribution as the over-all distribution of its basic light.

Lighting for the large drafting room is the most difficult of all lighting systems to design, taxing the skill of the most experienced illuminating engineer. Personal preferences may differ, but the facts of light remain the same to everyone alike.

"RE-TIMED" by HANNON
1. THEN YOU PICK UP THE .000" PIECE CAREFULLY SO AS NOT TO RUPTURE YOURSELF...
2. AFTER SECURING PIECE IN MACHINE YOU FIND YOU HAVE TO TAKE IT OUT AGAIN TO TOUCH UP A FEW TOOLS...
3. HURRYING DOWN TO THE GRINDER HOPING TO FIND AN UNUSED WHEEL...
4. YES SIR! THIS USUALLY HAPPENS, THOUGH IT ISN'T AT THE RATE THAT DAMNED GRINDER...
5. THEN BACK TO THE OL' GRIND YA GOT TO RETURN TO A FAST PACE AGAIN...
6. NO TIME FOR LUNCH ONLY FOOD ISN'T BAD LITTLE SOGGY THO'...
7. NO OH NO SCRAP I DON'T GET PAID FOR SCRAP ALL THAT TIME LOST LOST...
8. WELL THAT'S IT HEY MAC WAKE UP I SAID THAT'S IT...
9. DON'T YOU THINK IT'S WORTH THE EXTRA PENNY I'M ASKING ?...

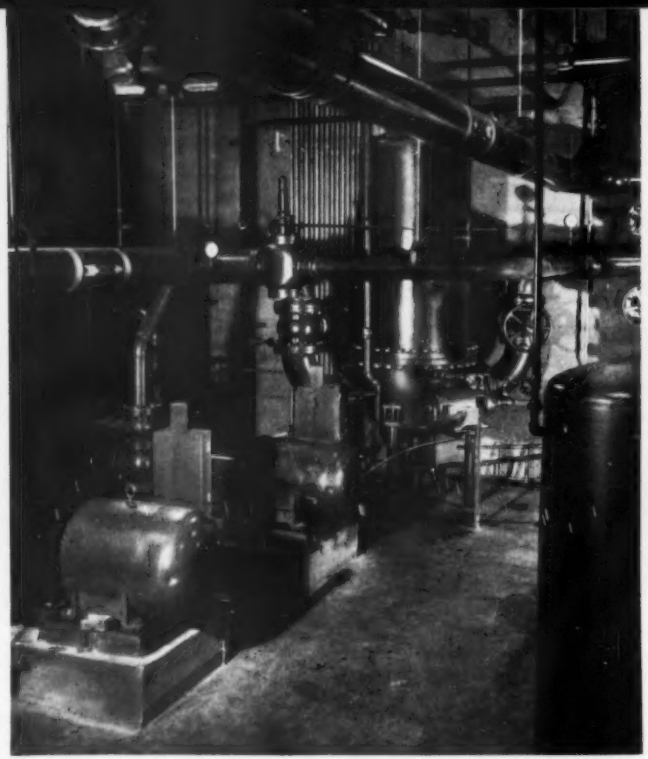


Photo: Cuno Engineering Corp.

An oil reclaim system which is installed at Acme Steel Co.'s Chicago plant

Oil reclaim systems have proved their worth whenever they have been chosen wisely for the job at hand . . . In this article, the author, who has had wide experience with oil reclamation problems, outlines the various types of systems and the advantages and disadvantages of each . . . The second part of the article will cover selection procedure and show how one plant went about the job of systematically finding out what type to use

OIL RECLAIM SYSTEMS

I—What Are the Various Types and Their Advantages?

By WILLIAM J. O'CONNELL, Process Engineer

PRIOR TO WORLD WAR II little thought was given to the idea of reclaiming oil for reuse. To be sure, many plants had some sort of a reclaim system, but compared to industry in general, such systems were little more than a drop in the oil bucket.

With the war and the actual and threatened oil shortages many more plants, with a thought to conserving their oil, installed systems, either from panic or from necessity. The experience of these plants has been a happy one. It is doubtful if there is a single case where a properly selected and used installation has not paid for itself many times over.

In the last six years, the increase in the use of oil reclaim systems has had a phenomenal growth. Rising oil costs have replaced the bugaboo of shortages. The idea of the reuse of oil being more widely known since 1945, the question at the present time is, "What is the best oil reclaim system to use?" It is the purpose of this article to acquaint the reader with the more widely used and proven systems, give some information as to the advantages and disadvantages of each, and to provide illustrations as to the method of system selection.

There are three types of systems in general usage. These are:

Filtration—by far the most widely known and in its varying forms most generally used. This system can be further broken down into various branches.

1. **Filteraid type**—where a slurry of a filtering medium is prepared and this used to coat a surface to act as the filtering surface.

2. **Replaceable filter**—a precut or prepared filter medium that is thrown away and replaced when used. This type also has two further ramifications: a. Single plate; b. Multi-plate.

3. **Permanent filter** — a reusable filter, single or multi-plate depending upon capacity.

4. **Self-cleaning filter** — a built-in filter that automatically back-flushes and drains off sludge at pre-set intervals.

Sedimentation — generally combined with sterilization. Works upon the principle that with an application of heat, oil viscosity is lowered and foreign particles will settle out.

Centrifugal Separation—not to be confused with chip spinners. Similar in principle to the cream spinner in that foreign objects are thrown farther than the oil. (Chip Spinners —separates oil from cuttings. Oil must then be reclaimed by one of the preceding methods. Will not be mentioned further).

In a short article it is not possible to go into detail about each method of oil reclaim, but each of the aforementioned has obvious advantages and disadvantages that may be elaborated to give the reader a wider acquaintance with each type. The points to follow have been culled from the writer's experience, and are not meant to disagree with, or to dispute the claims of, any manufacturer.

Note — Unless specifically excepted in the following descriptions, particle removal can be accomplished to

equal fineness. Any of the clarifying mediums referred to may be used in tandem or battery installations for alternate usage or larger capacity than one unit can give.

Filteraid Type Filter

Advantages — Low in first cost. Filteraid is relatively inexpensive also.

Disadvantages—Slurry tank takes up additional room. Requires experienced man to back-flush and recoat new filter plates with new slurry.

Single Plate Replaceable Filter

Advantages — Simplest of all in operation and maintenance.

Disadvantages—in large capacity units, filter unit is large and unwieldy to handle.

Multi-plate Replaceable Filter

Advantages—Simple in operation and maintenance. Most widely manufactured type, so there is a large variety of filters to choose from to meet special conditions.

Disadvantages—In large capacity units, there is a great number of filter units to replace at one time.

Permanent Filter

Advantages—Simple in operation. Except for normal wear, first cost is total cost.

Disadvantages — Moderately high in first cost. With oils, although not necessarily with non-viscous liquids, the filter inserts have to be removed for cleaning — back-flushing often being ineffective. Possibility of bacterial growth in filter inserts.

Automatic Self-cleaning Filter

Advantages—Simple in operation. Completely automatic.

Disadvantages — Highest in first cost. Generally applicable only for large capacity systems, where the installation justifies the cost. For viscous oils, not applicable for filtering particles smaller than 125 microns (0.125 mm or 0.0050 in.) in size. For finer filtration, the same objection as noted under permanent filter applies.

Sedimentation

Advantages — Provides sterile oil for reuse. Low maintenance requirement.

Disadvantages — Degree of filtration depends upon length of settling time, hence, except for low volume systems is not applicable upon a full flow basis. Large in size, least portable of all systems mentioned. Requires large dirty and clean oil reservoirs.

Centrifugal Separation

Advantages—Low in cost. Inexpensive in operation.

Disadvantages — Not particularly applicable where large amounts of contaminants are in the oil, due to relatively small sludge space. Where such a condition exists, there is a high maintenance requirement. Requires experienced man to disassemble and assemble. Will not remove all contaminants, particularly lighter materials with specific weights close to that of the liquid.

Keep Drums Rolling!— And Marked at Same Time

Formerly drums were marked with stencil and brush . . . Now, type is set in chase, inked, and drum is then rolled over . . . Result: clearer, sharper letters . . . Curved chase is used for packing cases

AN IMPROVED method of marking drums with a description of their contents, reference numbers and other data required by the customer or manufacturer, has been developed by the Imperial Chemical Industries Paints Division, Slough Works, Buckinghamshire, England.

Formerly, a stencil was wrapped around the container and the markings applied with a brush. Now, a strip of cast composition letters or numbers is inserted into metal channels in either a flat or a curved printing chase. The type can be melted down and recast from special letter-molds. The casting process can also be adapted quite simply for the casting of trade marks or designs. A special quick-drying and weather-resistant ink is applied with a hand roller and will normally give up to six impressions.

For drum marking, the flat chase is placed on the floor and the drums rolled over the type, giving a marking of perfect legibility. An operator can mark five hundred 5 gal drums in this manner in one hour. The curved chase is used in marking of packing cases, hessian bags, or paper containers.

Drum at left shows clarity of lettering obtained from method of rolling drums over board. Compare this with drum at right marked with stencil and brush

Packing case is marked with curved applicator which can also be used for marking hessian bags, paper containers

The drum is rolled over a board containing lines of type cast in gelatin. The type is roller-inked and up to six containers can be printed from one inking

Plant Engineers' Club, Instrument Society, Hold Joint Boston Meeting

THE REGULAR MONTHLY meeting of the Plant Engineers' Club of Boston was a joint session with the Boston Section of the Instrument Society of America; it was held Thursday evening, February 21, at the Graduate House, MIT. Over 100 members and guests of the two groups were present.

At speakers' table, standing, left to right: Ernest R. Hoffman, past president, Instrument Society of America; Charles H. Pierce, treasurer, Instrument Society (Kendall Control Corp.); John L. Clarke, program chairman, Instrument Society (Stone & Webster Engineering Corp.); Charles J. Montani, membership committee, Plant Engineers' Club (Robert Gair Co., Inc.). Seated, left to right: Frank L. Bridges, president, Instrument Society (W. B. Parsons Co.); Nathaniel B. Nichols, guest speaker, Manager of Research, Raytheon Mfg. Co.; Leo J. Monty, president, Plant Engineers' Club (Artisan Metal Products Co.); E. W. Benner, vice president, Plant Engineers' Club (American Sugar Refining Co.); Byron A. Engelbach, sec-treas., Plant Engineers' Club (New England Conf. Co.)

Guest speaker of the evening was Nathaniel B. Nichols, Manager of Research, Raytheon Mfg. Co.; Mr. Nichols spoke on the subject of "Process Design for Instrumentation." His talk was illustrated by a movie film.

Preceding the talk there was a lively discussion period on instrument maintenance. Points brought up for discussion were the scheduling of instruments for maintenance; how many instrument technicians are needed to properly maintain a given number of instruments?; how much cooperation should be extended the user of instruments by the manufacturer in the training of instrument mechanics?

The March meeting of the Plant Engineers' Club was a visit to the Harvard Brewery in Lowell, March 20. Following the plant visitation the Harvard Company were hosts to the Club at a dinner meeting.

Dinner meeting of the Plant Engineers' Club (Boston) and the Boston Section of Instrument Society of America, held at MIT

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Court Decisions on Performance of Wartime Contracts

If contract is made before war breaks out, is contractor relieved of performance? . . . If contract made during wartime and contingent on permission of government, is recovery possible? . . . Will refund release party to contract from performance? . . . Here are the answers

By ALBERT WOODRUFF GRAY

A CONTRACT was made during World War II by a Minnesota village for the construction of an electric light and power plant. Work was to commence within 10 days after filing of the performance bond and be completed within 180 days.

A suit involving a franchise conflicting with the operation of this proposed plant was pending at the time of the execution of this agreement. The contract, for this reason, provided that construction should not commence until this litigation had been finally determined in favor of the village.

This construction contract[1] was signed on August 16, 1940. The litigation to which the contract referred was determined in favor of the village on March 19, 1942. Three months before that date, however, December 8, 1941, the United States had entered World War II. The month following the entry of this country into that war, regulations and orders of the Federal War Production Board were issued prohibiting the performance of construction projects of this character without its authorization.

After litigation was determined, this contractor applied to the War Production Board for a preference rating certificate permitting the construction of this plant under its contract and a week later was notified by the board that, "Because of the acute shortage of critical materials needed for direct war use, it is suggested that you continue to operate with your present facilities."

These restrictions were not withdrawn until October, 1945. Upon the withdrawal of the restrictions the village sought a ruling by the Minnesota courts that this construction contract had not been terminated by the intervention of these wartime restrictions but that performance had merely been postponed and that with their removal this construction firm was under obligation to perform the contract it had undertaken 5 years before.

In holding this contractor relieved of performance and the contract at an end by virtue of these circumstances, the court said,

"It is only fair to say that an excusable delay which made it impossible for the engineering firm to commence construction until October, 1945, more than 5 years after the contract was signed, should also excuse it from performance, especially in view of the unprecedented and therefore unforeseeable conditions and circumstances which developed not only in the United States but throughout the world during that time. The mere fact that performance is made more difficult and expensive than the parties anticipated when the contract was made, will not ordinarily excuse performance. The true distinction is not between difficulty and impossibility. A man may contract to do what is impossible as well as what is difficult and be liable for failure to perform.

"The important question is whether an anticipated circumstance had made performance of the promise vitally different from what should reasonably have been within the contemplation of both parties when they entered into the contract. If so, the risk should not be fairly thrown on this contracting party."

Contract During Wartime

Another situation of this same character arose during World War I involving a subcontract[2] made on August 21, 1918, for the construction of a steel smoke breeching for $6,825. It was for a general contractor who had contracted with the United States, then involved in World War I, for the construction of an ammunition plant. Here, however, the contract was made with the knowledge of wartime conditions and the understanding that performance was contingent on government permission.

Shortly afterwards the government ordered the work completed within 3 weeks. When on September 6, 1918, two weeks after the making of this subcontract for this breeching, no work had been done, the subcontract was canceled. Suit was brought by the subcontractor for $1,600 representing expenses and loss of profits, a consequence of this cancellation.

Here the contract had been made during the war and that condition was necessarily known to both contracting parties. In the previous case, the war occurred after the agreement had been made.

The court said that no recovery of these prospective profits could be had, that "Both parties having had in view that performance might not be permitted by the United States, it was an implied part of their agreement that if performance were prevented by the government, both were to be released from any subsequent obligation. The effect of the rule is to excuse both parties from further performance of the contract without giving either the right to recover damages for the part not performed."

An obvious condition of the release of a party to a contract from performance under conditions of this character is the refund of any money received under the contract. A decision a few months ago[3] involved a situation of this sort in which the recipient of the payment contended that the performance of the contract had been merely postponed until the termination of the war and that as a consequence no recovery could be had of any payments made on account of the unperformed contract.

Holding that such payments must be returned, the court said, "Basic reasoning is that the probable length of the war is a speculative question; that conditions after its termination are likely to be vastly changed and that to hold parties to a prewar contract would in reality be imposing upon them a contract which neither had contemplated nor agreed upon."

This the court supplemented with, "The generalization may be ventured that government measures of unspecified duration under circumstances that suggest their indefinite continuation ought to absolve rather than suspend contracts of construction, sale and affreightment. In addition to the commercially desirable certainty of such a rule it would expedite the complete conversion of industry for war production and clear the decks for postwar reconstruction, unencumbered by lawsuits left over from a bygone era."

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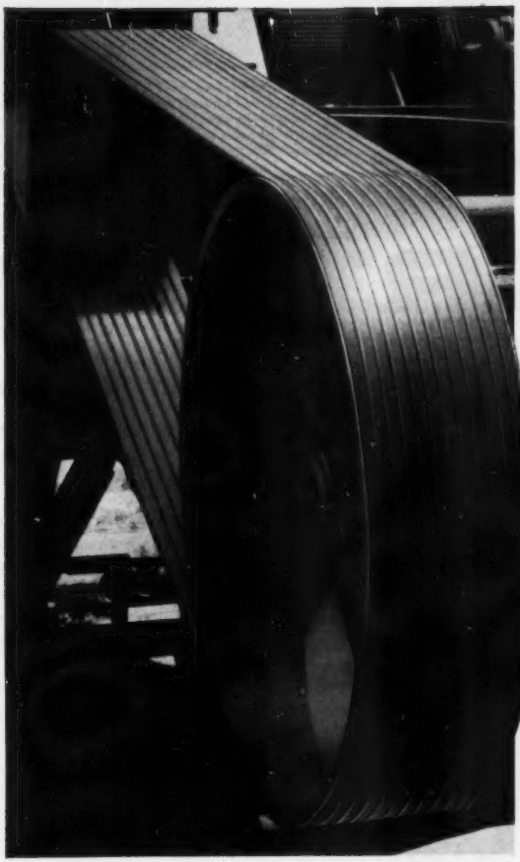
[1] Village of Minnesota v. Fairbanks Morse & Co., 31 N.W. 2d 920, Minnesota
[2] Philadelphia Boiler Works v. Foundation Co., 190 N.Y.S. 696, New York
[3] Monite Waterproofing Co. v. Sawyer-Cleator Lumber Co., 48 N.W. 2d 33, Minn.

How to Prevent Premature V-Belt Failure through Correct Installation!



DON'T pry V-Belts over edge of sheaves. (This can *injure* even the toughest belt structure.)

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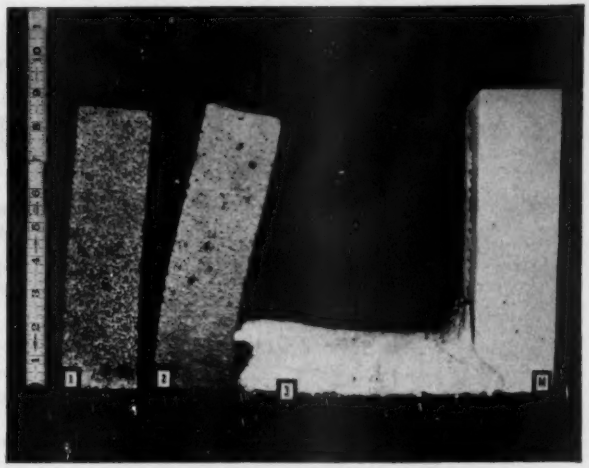

MULLITE refractories of certain types are often hard to get. However, the purest of the mullites — MULLFRAX electric furnace mullite — is still available. Made by melting together exact proportions of high purity raw materials, it is an entirely synthetic product. Hence, it is purer and more refractory than mullite obtained from natural sillimanite. Note, in the test above — five hours at 3000F — that the MULLFRAX brick ("M") is the only one of these four commonly used refractories, untouched by the heat.

MATERIALS?

modulus of rupture of one Super Refractory averages 3100 psi at 2460F). Most important, they *retain their strength* at temperatures where metals are unusable. All Super Refractories can be safely used considerably above 2800F, whereas 25-12 chrome-nickel steel loses strength rapidly over 1500F, is unsafe over about 2100F.

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Beveling commutator segment edges by using file which has previously been heated, bent and ground to a fine cutting point

For Good Motor Operation—

CHECK THAT COMMUTATOR!

Satisfactory d-c motor and generator operation depends mightily on correct operation, and therefore maintenance, of commutators . . . Article presents detailed information of check points, maintenance and repair procedure . . . Importance of cleaning, of spring pressure, of proper undercutting, are pointed out and the correct methods are described

PROBABLY THE MOST important single requirement for satisfactory d-c motor and generator operation is good commutation. No other one factor is likely to result in as expensive repairs and shortening of equipment life as commutation troubles permitted to become cumulative.

If possible, d-c motors and generators should be checked daily for evidences of excessive brush sparking, chattering or heating, and for loose brush shunts, presence of unusual commutator deposits or coloring, leakage of lubricant from the bearings, commutator heating, or any other unusual indication.

Once a week, each such machine should be shut down and given a more thorough examination. Brush lengths should be noted and, if worn to less than ¼ in. remaining travel, the brushes should be replaced with new ones. Inspect the brush contact faces for full seating on the commutator and look for deposits of embedded mica flakes, copper particles or other foreign material.

Also check the condition of the brush shunts, to discover any evidences of excessive heating or fraying. And see that the shunts do not restrict the travel of the brush or brush holder arm.

Make sure, too, that the brushes are free to move in the holders but are not excessively loose, that the pressure arms and springs move freely, that the brush holders are tight on their supports, and that all current connections are tight.

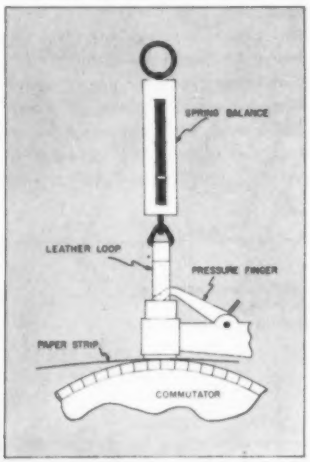

Fig. 1. Checking spring pressure on the brushes by means of scale or balance

CHECK SPRING PRESSURE

Next check the spring pressure on the brushes. To do this, use a hand type spring balance or scale of moderate capacity and graduated to read in ounces, as shown in Fig. 1. Replace the metal hook on the lower end of the scale with a loop of leather. This loop is placed beneath the end of the brush holder pressure arm that rests on the brush. With a strip of paper between the brush and the commutator surface, pull the scale slowly in a direction parallel to the brush until the strip of paper can just be pulled easily from its place, then note the scale reading.

By multiplying the thickness of the brush by its width and dividing the scale reading by the result, the brush spring pressure in pounds per square inch of contact area can be obtained. This is considered approximately the actual pressure of the brush on the commutator, in the case of radial brushes. However, where brushes are set at an angle (either leading or trailing), the actual effective pressure on the commutator will be proportionately less than the apparent pressure as obtained by the calculation given, depending upon the degree of brush angle from the radial.

Usually the spring pressures in pounds per square inch recommended for brushes in industrial service are 2 to 3 for electrographitic, 1¾ to 2½ for carbon and carbon-graphite, 1¼ to 2 for soft

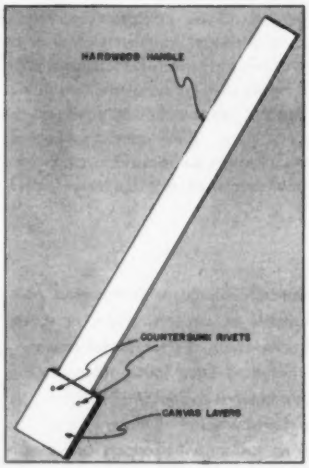

Fig. 2. Canvas wiper which can be made on the job and used for cleaning

operating costs

Cut ½

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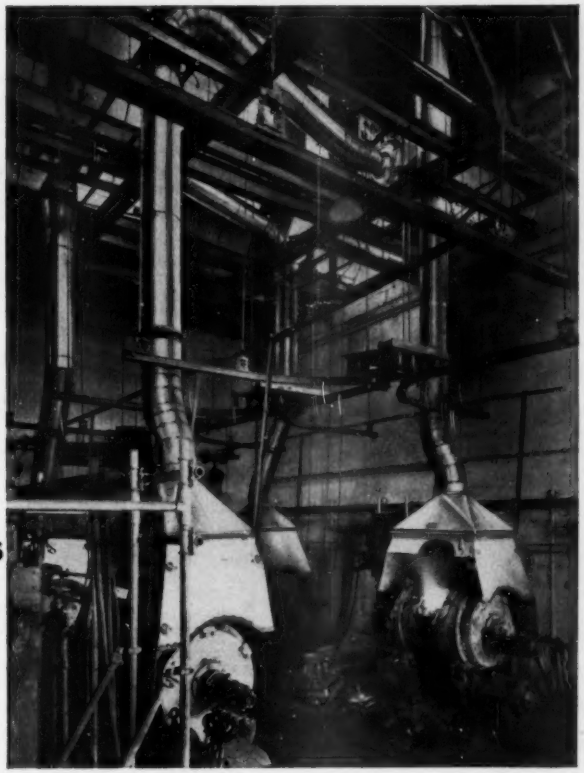

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FUME CONTROL SYSTEMS

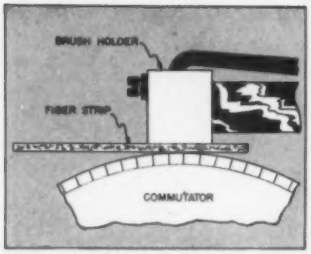

Fig. 3. Use of a fiber strip for aligning brush holder when it is impossible to use adjacent holder for this purpose

graphite, 3 to 4 for firmly bonded graphite, and 2½ to 3½ for metal-graphite slip ring brushes.

Whenever the spring pressure is found to be below that recommended for the brush grade in use, increase the spring pressure adjustment to the proper value. Where all the brushes have been installed at the same time and the commutator surface has developed no defects, nor have any of the brushes been permitted to carry more than their share of the current load, all brushes should have worn equally, hence it is necessary to test the spring pressure on only one brush. The pressure spring adjustments of all other brushes may then be set the same as the tested brush.

BEWARE DIRT

Examine the commutator carefully for high mica (or mica fins if undercut); dragged copper at the trailing edges of the segments; dust, oil or grease deposits on the surface or between the segments; etching or burning of the segment surfaces or edges, or streaks or threading of the commutator surface.

Check the edges of the commutator V-ring and the adjacent shaft for indications of oil film accumulation, and see that no lubricant is escaping from the bearings. Also examine the surroundings to be sure that no nearby oil spray, moisture or other contaminants can reach the commutator.

Any accumulations of dust, oil or grease should be carefully removed from current carrying parts (especially the commutator and brushes) and non-current carrying parts. A solvent and a cloth or brush may be employed to remove grease or oil from the latter parts, but usually an oil-free solvent applied with a brush is required for such cleaning of current carrying parts. Only a non-toxic, harmless type should be employed, however, as some types are very dangerous to health. Medium pressure compressed air, a portable blower or a hand bellows should be used to remove dry dust from the commutator, brush holders and other parts of the machine.

A considerable number of operators of d-c motors and generators find it advisable to clean the surface of commutators with a canvas cleaner at periodic intervals, in some cases daily or even oftener. The general type of cleaner used can be constructed on the job, as shown in Fig. 2. It consists of a hardwood handle to which is attached about fifteen layers of folded six or eight ounce hard woven duck with countersunk rivets.

The canvas wiper is applied to the commutator with considerable pressure in order to remove all surface deposit and act as a burnishing agent. When an outer layer of canvas becomes too dirty or worn it can be readily cut away, thus exposing another clean layer.

BRUSHES, BRUSH HOLDERS

Any faults discovered at the periodic inspections should be corrected as soon as possible. Where brush faces show evidences of less than full bearing surface, or embedded mica or copper flakes, apply a soft brush seater stone to the commutator, behind each brush, for a moment while the machine is running, and apply increased pressure on the holder arm at the same time. The abrasive worn from the stone will pass under the brush and clean and reseat the contacting surface.

If any brushes stick in their holders, rub the sticking surface on sandpaper resting on a flat surface, removing just enough material to permit the brushes to slide freely in the holders.

If brush shunts are found restricting the movement of the brush or holder pressure arm, alter their position so as to correct this condition.

Sometimes brush holder arms will bind at the hinge and become sluggish. This condition can be eliminated by removing the hinge pin and cleaning its surface with a cloth moistened with solvent. A further light sandpapering of the pin surface may be necessary in some cases to remove hard deposits or burrs.

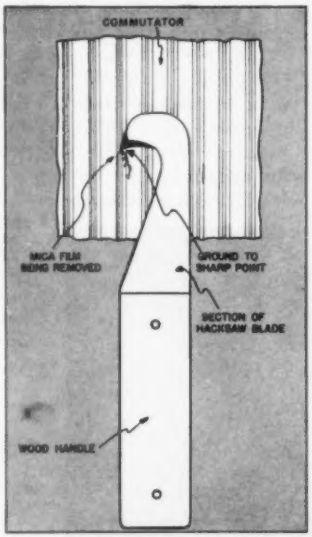

Fig. 4. Knife made from hacksaw blade can be used effectively to remove fins

If any brush holders are found to have become loosened on their support, see that they are aligned with the adjoining holders and set the same distance from the commutator surface, then re-tighten. Where another brush holder cannot be used as a guide, place a piece of ⅛ in. thick fiber or wood on the commutator surface and hold the brush holder against it while tightening, as shown in Fig. 3. Smaller motors generally have the brush holders set closer than ⅛ inch. Since the brush face may no longer make accurate contact with the commutator, reshape it with sandpaper or abrasive

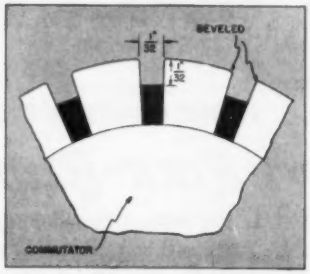

Fig. 5. U-shaped slot is effective until the commutator has worn completely down to the depth of the undercut

cloth, or a brush seater stone, as explained later for sanding in new brushes.

All bolts, nuts, screws or other means used to make electrical connections to the brush holder studs, shunt, series or interpole coils, etc. should be kept tight. If any are found loosened, disassemble the connection, sandpaper the contacting surfaces, clean, and reassemble and tighten. This procedure is advisable in order to eliminate the possibility that corrosion or burning, caused by the high resistance of the joint, might prevent making an adequate electrical connection.

Where high mica is found on a non-undercut commutator, the commutator may be resurfaced with a hand type resurfacer stone of very fine grit, followed by a polishing grade stone. The stones should be as large as can be used conveniently, and should be held very steady, under uniform pressure, while the machine is running, and slowly moved back and forth over the entire commutator surface.

Provided the brushes are properly staggered so as to evenly cover the commutator surface, it is probable that high mica on a non-undercut commutator may indicate insufficient abrasive content in the brushes being used. However, since exces-

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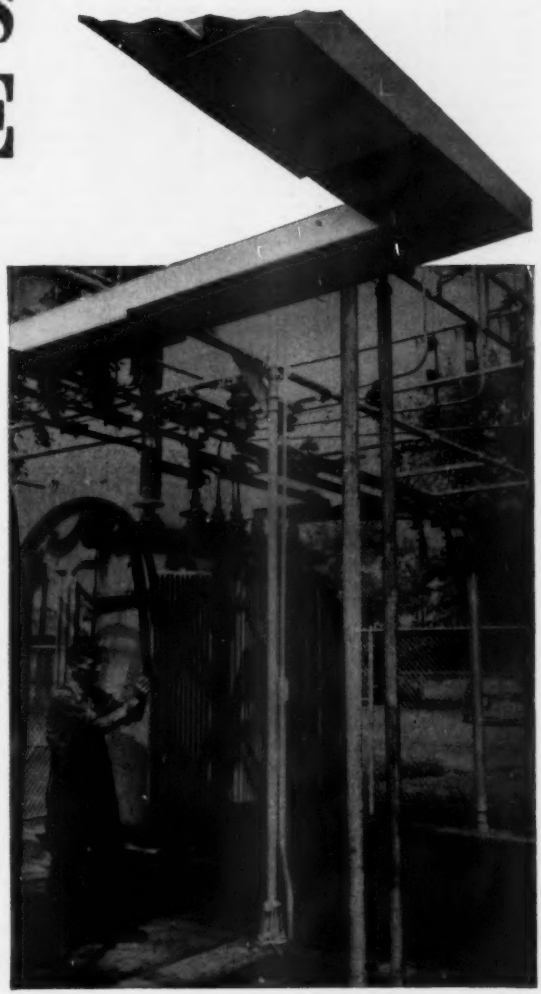

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BUS DUCT

sively abrasive brushes can cause unnecessarily rapid wear of the commutator copper, it is advisable to consult a brush company engineer as to the proper grade brush to use under existing conditions.

On undercut commutators, mica fins, if present, are usually found against either side of the slots between the copper segments. It is just as important to remove these bits of mica as high ridges of mica on a non-undercut commutator, since in either case the brushes will be prevented from making continuous contact on the commutator and destructive sparking will result.

Figure 4 shows how a knife, made from a piece of discarded hack saw blade and a bit of wood, can be used to effectively remove mica fins. It is important not to miss any mica fins, since even one can cause sparking and consequent commutator damage. It is advisable, when searching for mica fins, to use a reading glass or magnifying lens in order to make the task easier and relieve eyestrain.

The removal of dragged segment edge copper is explained later, and the removal of dust, oil or grease deposits from the commutator has already been covered.

COMMUTATOR SURFACE

The presence of etched or burned commutator segments indicates some defect such as high mica (on non-undercut commutators) or mica fins (on undercut commutators), brushes set off neutral, improperly adjusted interpoles, accumulations of dust, oil or grease, incorrect spring pressure on brushes, brushes sticking in holders, machine overload, rapid load change, plugging or external short circuit. If none of these conditions are found, the trouble may be due to a defect in the machine design, requiring the services of an engineer to discover and correct.

Where the commutator surface shows streaking or threading, the cause may be due to low machine load, contaminated atmosphere, oil on the commutator, high or low humidity, incorrect brushes, high mica or mica fins, brushes set off neutral, improperly adjusted interpoles, machine overload, rapid load change, plugging or dynamic braking.

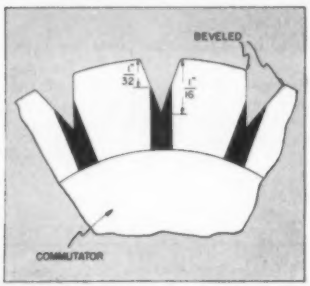

Fig. 6. V-shaped slots are generally cut on an angle of 40 deg for thin mica, 50 deg for medium mica, and 60 deg for the thicker types of mica

It is particularly important to keep the edges of the commutator V-ring and the adjacent shaft surface free of oil or oil film, since the oil will creep onto the commutator surface. If bearing lubricant leakage is found, it may be necessary to renew the shaft seal, or to replace any gaskets that are defective.

It is impossible to have satisfactory commutation if the commutator surface is defective. Sometimes eccentricity can be tolerated if the machine operates at slow speed and the brushes can thus maintain good contact with the commutator. However, since the constant movement of the brushes in their holders causes wear of the brush material and consequently looseness of fit, even this type of defect should be corrected.

Flat spots, high or low bars or high mica cause sparking and are defects that should be rectified without delay, since their destructive actions are cumulative.

A defective commutator should be turned down in a lathe or ground smooth with a commutator grinding device. The latter method has certain advantages over turning with a lathe tool. Since the commutator is ground while the armature is running in its own bearings and usually at normal speed and centrifugal stresses are normal, more accurate results are obtained. Furthermore, the fact that machine disassembly is not required results in a considerable saving in time and lessening of the danger of damage to the armature.

Before beginning grinding operations, the commutator surface and the slots between the segments should be carefully cleaned of any oil or grease present, using a cleaning solvent and a brush or cloth. This will prevent the adherence of copper and mica dust during grinding and the possibility of scratching the commutator surface as a result.

If new brushes are to be installed on a motor, they should be installed after the commutator has been resurfaced, and the old brushes, if possible, should be used during grinding. This will eliminate the excessive wear to which the new brushes would be subjected if they were employed during resurfacing.

Where high or low commutator bars are present, the commutator should be carefully tightened before grinding. Do not tighten the commutator excessively, however, as this will buckle the segments.

The depth of grinding necessary to remove all traces of commutator surface defects will determine the types of stones to use. Where considerable copper must be removed, it is advisable to start grinding with a "coarse" grade stone, then use a "medium" or "finish" grade, and finally apply a "polish" grade to impart as smooth a surface as possible.

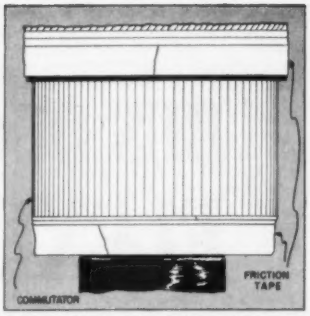

Fig. 7. Protect insulation of commutator, before beginning undercutting, by layers of tape at front and back

Wherever possible, the machine being resurfaced should be driven by a separate source of power. But where it is necessary to operate it under its own power, grinding may be done on low voltage equipment if extreme care is taken. No metal part of the grinder must touch any current-carrying parts of the machine, since grounds and shorts might result, and caution must be observed to avoid the danger of electric shock.

Generally it is possible to mount the grinder on the frame of the machine or, by means of insulated bushings, on one of the brush holder studs. It is important that grinding pressure always be moderate, so as not to distort the brush holder stud or the commutator segments. Be careful to grind equally across the face of the commutator, so as to avoid grooving or tapering.

UNDERCUTTING

After a commutator has been resurfaced it should be examined for adequate undercutting (unless it is of the flush mica type). If the undercut slots are less than 1/32 in. deep where U-shaped slots are employed, or 3/64 in. in the case of V-shaped slots, the commutator should be undercut. This may be done with an undercutting file or a ground down hacksaw blade if the commutator is very small, but for medium and large commutators it is preferable to employ a power driven undercutter, to save time and labor.

The choice of slot shape depends to a considerable extent on operating conditions. The "U" slot, Fig. 5, has the advantage of being effective until the commutator has worn down the depth of the undercut, however, it does not permit dust particles to be thrown out of the slots as readily as from V-shaped slots. The latter are also considered to be self-ventilating, less noisy and to have greater arcing distances; also, there is less possiblity of mica fins being left along the slot sides.

"U" slots should generally not be

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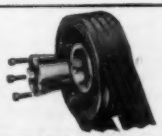

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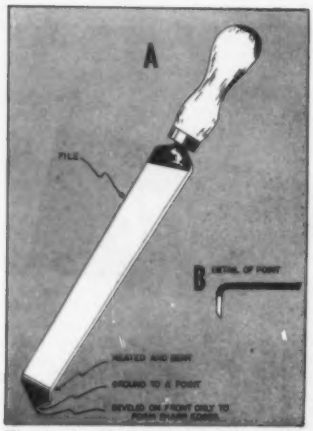

Fig. 8. An ideal tool for undercutting may be made from a worn-out file which has been shaped and sharpened

cut deeper than 1/32 in. or, at most, 3/64 in. where the mica is of average thickness. The width of cut should be slightly wider than the mica thickness.

"V" slots, Fig. 6, are generally cut on an angle of 40 deg for thin mica, 50 deg for medium mica and 60 deg for thick mica. The depth of cut should be about 1/16 in. This will leave about 1/32 in. of copper above the mica on each side of the slot, as shown.

Before beginning undercutting be sure all current is off the machine, and it is well to protect the insulation at the front and back of the commutator by means of several layers of friction tape, as shown in Fig. 7.

In using a power undercutter, care is necessary to prevent the rotary saw or cutter from riding out of the slot and cutting across the face of adjacent copper segments. The spacing guide must also be adjusted very carefully, to insure that each successive cut will begin exactly in the center of the mica. Even a very slight discrepancy in this adjustment will cause trouble because it becomes cumulative, gradually resulting in the removal of an excessive amount of copper from one side of the slots and in leaving a strip of mica along the other side.

When all slots have been undercut, the edges of the copper segments should be given a slight bevel. This removes all remaining copper slivers and permits the brushes to ride more smoothly. The tool shown in Fig. 8 is ideal for this purpose. It is made from a worn out file, heated near the end and bent, and ground to a sharp beveled point. This is dragged lightly along each slot from the back to the front of the commutator two or three times. Usually a squeaking sound is heard on the second cut, indicating that all copper slivers have been removed. This generally serves as a signal that the beveling of the slot is completed.

This method will also remove dragged copper that builds up at the trailing edges of the commutator segments due to wear of the commutator surface, as mentioned previously.

Next brush out the commutator slots from back to front with a stiff bristled brush, remove the protective tape wrappings, and blow all remaining dust from the commutator and brush holders, as well as from other parts of the machine, directing the air stream from back to front of the commutator to avoid driving copper particles into the windings.

Then the machine should be again operated and very fine sandpaper or abrasive cloth applied to the commutator surface, to remove any remaining burrs and impart a very smooth finish.

On commutators that do not require renewal of the undercutting, grinding should be followed by segment beveling, polish sandpapering and cleanup, as previously explained.

BRUSH INSTALLATION

In installing new brushes, the same grade should be used provided it has given complete satisfaction. Where commutation has not been satisfactory, however, the machine manufacturer or the maker of the brushes should be consulted as to the proper grade of brushes to employ. This is very important, since many factors enter into correct brush application, and sometimes special tests are required in order to analyze commutation difficulties and make intelligent recommendations. Because the replacement of a commutator can be an expensive undertaking, it is vitally important to prolong commutator life by obtaining and maintaining satisfactory commutation.

Brushes should be so spaced that they will cover the greatest possible area of the commutator, allowing for armature end play, to minimize commutator wear and prevent grooving. When more than two sets of brushes are employed, set them so that brushes of the same polarity will not track each other. This helps equalize the commutator surface film, which is different under different polarity brushes, and improve performance.

See that the new brushes slide freely in the brush holders throughout their length but are not too loose. Check the holders for rough or burned projections, caused by arcing, which may interfere with free brush travel. Tighten the brush shunt terminals securely and make certain that the brushes are not restricted in any way by the shunts.

Sand in one brush at a time, having all other brushes off the commutator at the time, using a strip of relatively coarse abrasive cloth wider than the brush width. Apply full spring pressure to the holder and keep the abrasive cloth close against the commutator surface. Sand in both directions.

When the brush face becomes fully shaped to the commutator arc, finish sanding with a strip of very fine abrasive cloth, sanding only in the direction of commutator rotation and raising the brush on each return stroke. Continue sanding until the brush face is smooth over its entire surface.

After all brushes have been finish sanded, blow out the dust from the holders and commutator and set all brushes on the commutator. Start the machine and apply a brush seater stone behind each brush in turn. This will impart a smoother finish to the brush faces.

Then again lift the brushes from the commutator and blow out all accumulated dust, return the brushes to the commutator, measure and adjust the brush spring pressures, and apply a load on the machine. If possible, the load should be low until the brushes begin to show a fully polished appearance, indicating a full seating on the commutator, after which the load should be built up to full load.

Caution should always be observed when grinding or undercutting commutators, sanding in brushes, and blowing dust and chips from the machine. Goggles and a respirator or dust mask should always be worn, and it is advisable to protect the face, head, hands and arms as the abrasive and copper dust is quite irritating.

Tightening brush support terminal. Details on brush installation in article

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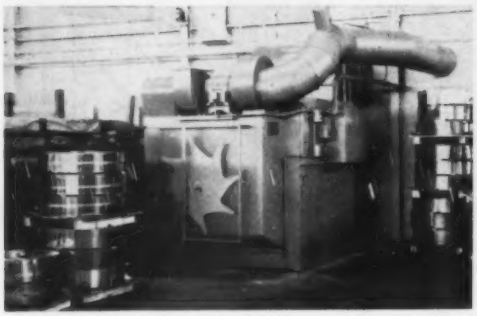
News From the Plants

Dry Air Rustproofs Steel in Storage



An estimated saving of $2000 per year in labor and material costs has been realized at the Kenilworth Steel Co., Kenilworth, N. J. Following the installation of a dehumidifier to control the supply air to the steel storage room, high quality steel received for processing can be put directly into storage.

Formerly, all steel received had to be inspected for rust, oiled prior to storage, and periodically oiled and inspected while in storage. With controlled humidity, steel shipments can be put into storage directly upon receipt, without oiling. The housekeeping problem, labor costs, and inspection time attendant with the oiling are therefore eliminated. In operation, steel has been taken from storage in the same condition in which it was received, months previously, with no evidence of rust.

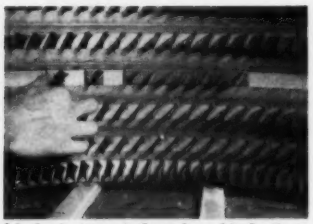
The dehumidifier, located outside the storage room, is a product of the Pittsburgh Lectrodryer Corp., Pittsburgh, Pennsylvania.

Jet Blades Fabricated for Speed

A new manufacturing process in aircraft turbojet engine production is in use at the General Electric Co. The process involves welded fabrication of the formerly forged stator blades of jet compressors.

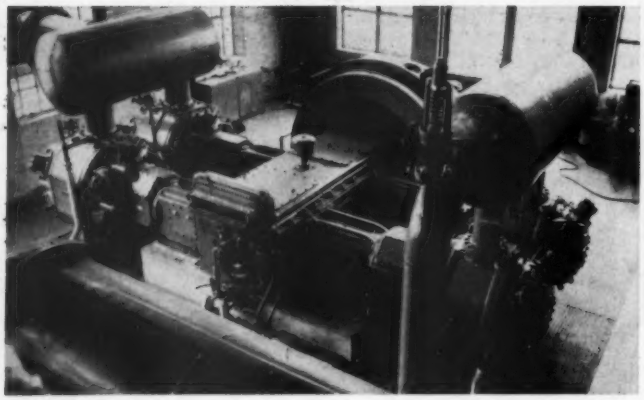
Previously, the stator blade and its base were hammered from a single piece of stainless steel. The air foil was formed during the hammering process, and the base dovetailed to fit into a blade ring between spacers. The fabrication process, however, uses blades rolled in long strips, contoured to the proper

air foil, and then cut to the desired length. The blade base is separate, with an opening into which the



blade is inserted and welded. It is shaped to fill the same area as the ring spacers, thus eliminating them.

New Compressor Supplies Production Lines



The largest capacity air compressor in Ford's giant River Rouge plant, and one of the largest, capacity-wise, in the state of Michigan is now in continuous operation. Installed to meet the growing demand for air power on the automotive production lines, this compressor solved the problem of capacity without extreme size. Its balanced and opposed construction permitted the drive motor to be shaft mounted, with an appreciable floor space reduction. The two-stage compressor, driven by a 2,000 HP motor, delivers 10,000 cfm at 110 psi to the aftercooler.

Installation of the unit was completed in 14 days. The compressor, powered by a General Electric motor, was manufactured by the Clark Bros. Co., Inc., Olean, N. Y.

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News From the Plants

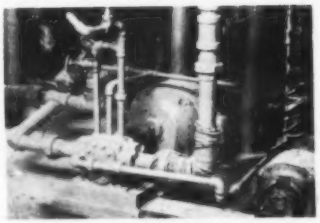
Lathe Chips Take a Ride on Steel Belt Conveyor

Conveyors are being used at the Erie, Pennsylvania, plant of the General Electric Co., to mechanize chip removal from automatic lathes. The conveyor units transport brass chips from the lathes to tote boxes while the machines are in operation. Manual scrap handling has been eliminated and the speed of chip disposal substantially increased.

In the installation, chips are funneled onto the hinged-steel belting, carried horizontally until clear of the lathe's operating mechanism, and then transported parallel to the lathe up the conveyor incline. This conveyor is raised enough to permit chip drop-off into the tote boxes.

Features of the self-contained installation include an adjustable safety clutch, which disengages in the event of an overload, and the special belting used, which incorporates interlocking side wing design to prevent chip fall-through. The Chip-Tote conveyor system was manufactured by May-Fran Engineering, Inc., Cleveland, Ohio.

Pumps Jacketed to Keep Them Warm



Steam jacketed herringbone gear pumps are used to distribute fats and oils at 15 gpm from the storage kettles to mixing and blending kettles, at the Hachmeister, Inc., plant in Pittsburgh, Pennsylvania.

The two pumps in use have proved advantageous in operation because the steam jacket eliminates the need of outside heating to maintain the viscosity of the material being pumped. Also, they pump liquids of widely varying viscosities equally well, and maintenance cost has been negligible on the pumps since their installation.

The steam jacket completely covers the internal parts, insuring even thermal distribution, with the inlet, outlet, and cover plates cast integrally with the pump base. The pumps are a product of the Schutte and Koerting Co., Cornwells Heights, Bucks County, Pennsylvania.

Iron Filings No Longer Go "On Record"

Protection of the stampers used to press RCA Victor vinyl records is the prime function of several magnetic separators installed in the conveyor lines in the process.

Metallic particles play havoc with the grooves of sound patterns impressed on the die. The tough vinyl compounds prevented these metallic particles from imbedding themselves in the plastic, hence they remained on the surface of the record.

In spite of the infinitesimal quantity of metal in the plastic, its removal was necessary, and the solution of the problem was found in the installation of magnetic separators which would pick out the tiny iron filings from the plastic.

The installation of the magnetic separators increased die life many times, and reject decreases provided an additional savings. The magnetic separators are manufactured by the Eriez Mfg. Co., Erie, Pennsylvania.

"Dag" Colloidal Graphite... for Hot-Working Operations

At 500° F., and virtually as far up as you ever go in metalworking operations, **"dag"** colloidal graphite is a lubricant that does not gum up . . . that defies break-down. For brass, bronze, aluminum, magnesium, carbon steel and stainless steel . . . wherever your fabrication problems are friction and heat . . . this unusual lubricant reduces one and resists the other.

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For more information on the "Use of Colloidal Graphite for Metalworking Operations," write for Bulletin No. 426-22E.

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News From the Plants

Air Ducts Under Floor Prevent Ground Freezing

Photo: National Clay Pipe Assoc.

Vitrified clay pipe is being used in an air circulation system designed to prevent ground freezing beneath a concrete floor slab. The system is installed in a cold storage building of the Merchants Ice and Cold Storage Co., San Francisco.

With the exception of the cemented joints in the header, the system was laid with dry joints. The pipe was laid in crushed rock fill, which was leveled and rolled to receive the concrete sub-floor slab.

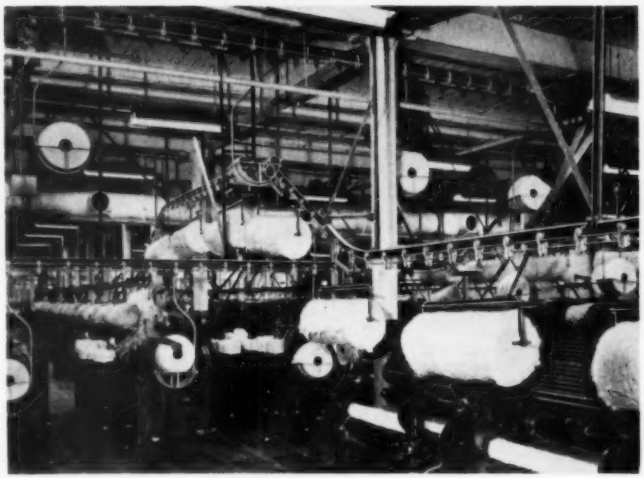
Air circulated through this clay pipe duct system will counteract the ground freezing action of the cold storage room temperatures.

Textile Handling with a Modern Touch

With the completion of a recent expansion program at the Kendall Mills plant in Newberry, S. C., 61,000 spindles and 1440 looms are now in operation. This doubling of the mill's previous capacity required new methods of materials handling, and three conveyors, totalling over 2400 ft in length, are the feature of these new methods.

Two of the conveyors carry laps of cleaned and fluffed cotton from the picker room to the card room.

The third conveyor, known as the drawing lap conveyor, delivers wound laps, 9 in. wide, 18 in. in diameter, and weighing about 20 lb, to the drawing frames for further processing. Specially designed carriers are used in both conveyor applications, and building layout required unusual design, with conveyor line cross-overs and inclined runs. The system was designed and installed by E. W. Buschman Co., Cincinnati, Ohio.



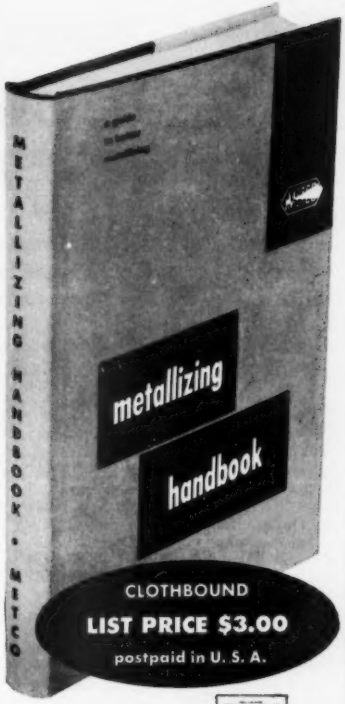
Surface Gage Holds to Close Tolerances

A new precision gage has been designed to be used in machine shops and plants to insure accuracy of highly finished surfaces. Sensitive to surface variations as small as one millionth part of an inch, the gage is a rugged, portable instrument that can be plugged into an electrical outlet anywhere in a plant.

To determine the relative surface roughness value for a machined part, a pickup with a diamond stylus is moved over its surface. As the stylus moves over the infinitesimal peaks and valleys of the surface, the up-and-down motion is transformed into electrical voltage, and transmitted to a meter dial.

The gage, known as a Surfagage, was developed by the General Motors Research Laboratories.

new metallizing handbook



comprehensive 250-page volume covers all phases of this modern metal spraying process

This completely new metallizing handbook contains 250 pages of "how-to" information, including the very latest developments in the re-surfacing of worn machine parts, corrosion protective coatings, and specialized metallizing applications. Profusely illustrated with pictures, diagrams and charts, this new text is an invaluable reference for anyone concerned with metal working and the maintenance of machines, as well as with iron and steel structures and exposed equipment.

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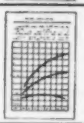
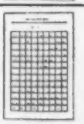


TABLES — aid in the selection of correct spraying metals, cutting tools and recommended rake angles, machine feeds and speeds, recommended grinding wheels and their characteristics, blasting methods and materials. Tables are also included in order to aid in estimating costs.



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Selection, Use And Care of Tools

Rules and Measuring Tapes—Good selection and proper care of accurate measuring tools will insure accurate work results

By THOMAS TRAIL, Maintenance Engineer

NO MATTER how skilled a mechanic may be he cannot do accurate work without accurate measuring tools. Personal choice will naturally govern the types of rules and tapes one may wish to have available, but a good selection for all-around work consists in a 6 in. steel rule, a 5 or 6 ft folding or slip joint rule and a 50 ft steel measuring tape. If preferred, a pocket type flexible steel pull-push rule may be substituted for the folding or slip joint rule.

A 6 in. steel rule is convenient for measuring short distances or where considerable accuracy is required, such as machine parts, lathe work, etc. A flexible type rule is advantageous in that it can be employed for measuring in cramped quarters where a stiff rule cannot be used. Where the rule will be subjected to considerable moisture or mild acid fumes, it is advisable to select one made of stainless steel.

Various Rules Available

Steel rules are available in a number of graduation types for various measuring purposes. A practical type of graduation consists in having eighths and sixteenths of an inch on one side of the rule and thirty-seconds and sixty-fourths of an inch on the other side, as shown in Fig. 1. The additional feature shown of short graduations in thirty-seconds of an inch on both sides on one end is also convenient, where measurements must be taken in narrow spaces.

Steel rules can be obtained in numerous types, widths and lengths as desired, including tapered end; tables of decimal equivalents or drill sizes on one side; hook end; with caliper slide; with knurled handle; beveled edge; or with pocket clip. Graduations can be had in English or metric, and in standard, special or shrinkage allowance.

Folding rules come in various types of English and metric graduations, and, in wood construction, in white, yellow or natural color. White is generally preferred because of better legibility. Natural color withstands greater wear, however, than the enameled types. Several types of metal folding rules are also available.

A handy type of folding rule is one having the numbered graduations beginning on the inside face of the folded rule, as shown in Fig. 2. This permits the markings to lie close to the work, a distinct advantage when only part of the rule is unfolded for use.

Folding rule markings can be had in horizontal or vertical marking, and in single edge or double edge graduation. The vertical marking with double edge graduation, as shown in Fig. 3, is considered preferable, since the rule can be read in any position.

Another type of folding rule is the extension rule. This rule is equipped with a sliding metal section on the first wood section of the rule. This permits inside measurements to be taken more readily, as shown in Fig. 4.

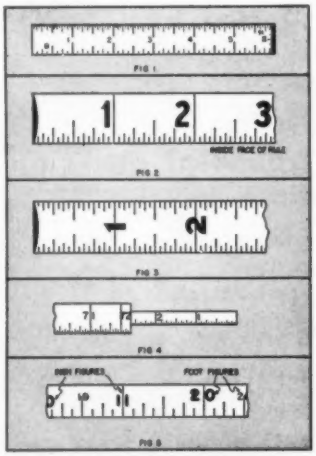


Fig. 1. Rule graduations; Fig. 2. Graduations on inside face; Fig. 3. Vertical marking with double edge graduation; Fig. 4. Extension rule; Fig. 5. Graduation on measuring tape contains the foot figure before each inch marking

Slip joint rules are arranged so that the sections slide instead of fold at a hinged joint. These can be used also for inside measurement.

In selecting a folding type rule, examine the joints to see that they are so arranged that slippage is impossible, as slippage or looseness of joints will render a rule useless. Some quality rules have automatic takeup provisions in the joints, to compensate for wear and thus insure accuracy over a long period of use. On concealed joint rules it is desirable to have strike plates, to prevent wear of the graduations at the joints.

Folding and sliding rules should be opened and closed carefully, to avoid breaking the sections. They should likewise not be walked upon nor thrown among heavy tools. Wiping the wood surfaces with a cloth dampened with water and mild soap will help remove soil marks. The rule should be dried thoroughly afterwards. To minimize wear of the joints and insure easy operation, a drop of thin lubricating oil should be occasionally applied to each joint.

Measuring Tapes

Measuring tapes are made in various lengths, usually up to 100 ft. A steel tape is superior since it will not stretch. Tapes are available in metal or leather cases, and with graduations in English or metric, or English on one side and metric on the other. Tapes can also be obtained in special forms of graduations. They are arranged either to be wound into the case by means of a hand crank or by means of an automatic spring.

In selecting a measuring tape, a suitable length, having clear, long-lasting graduations should be chosen. One convenient style of graduation contains the foot figure before each inch mark, as shown in Fig. 5. This saves time and helps eliminate chance of error in reading.

In drawing a tape from its case, hold the case in proper position to prevent the tape being kinked or bent and pull the tape straight out from the case, never at an angle.

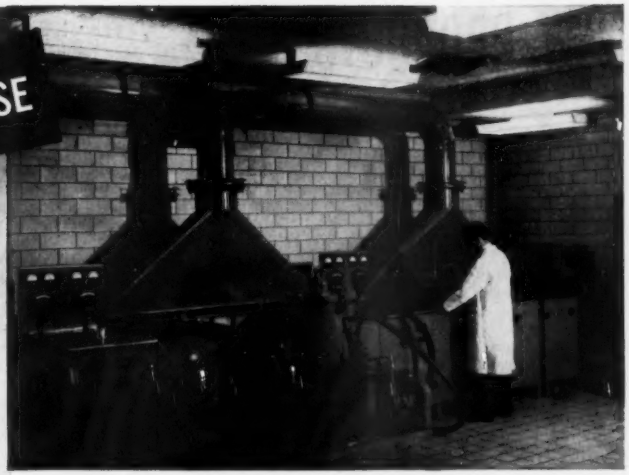
In winding a tape into its case, if it tends to pull hard, rap the side of the case carefully against a flat surface to free the turns of tape inside the case. A spring-wind tape should be guided into the case and not allowed to rewind unchecked.

Steel rules and tapes should be wiped after use with a cloth moistened with a few drops of thin lubricating oil, to keep them clean and help prevent rusting of the metal. A drop of oil should also be applied to the winding spindle and handle hinge occasionally. Pull-push rules should be given care similar to that suggested for measuring tapes.

WESTINGHOUSE

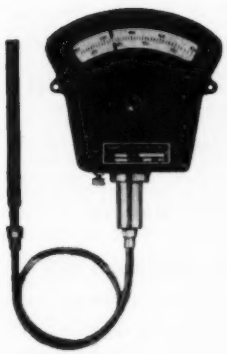
Our illustration shows a corner of the extensive pilot plating plant at Westinghouse's East Pittsburgh laboratories, where many improved plating processes have been developed and tested.

For example, this line of 100 gallon tanks was used to perfect the company's P.R.* process of plating to secure brighter finishes by periodic reversal of the plating current.



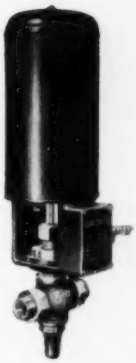
Five Sarco Type LSI indicating electric controls actuating solenoid valves to maintain any desired constant plating temperature on 100 gallon tanks of PR process pilot line at East Pittsburgh.

SARCO PLATING CONTROLS



Sarco Plating Controls were selected as a result of several years' experience in Westinghouse plants in Pittsburgh and elsewhere.

You can buy them with confidence. Low first cost, high accuracy, long life with minimum maintenance cost are outstanding features. Write for our Bulletins and the name of the Sarco man nearest you. His experience may include the solution to some of your control problems.



Sarco Type LSI indicating electric temperature control for all kinds of plating. Long or short temperature ranges custom made as needed. Bulletin 1026.

*For full information on this process see the article in the May 1st, 1950, issue of "Steel".

New: Sarcostat hydro-electric motor valve for use with LSI thermostats in place of solenoid valves. Powerful, direct thrust—no pilots or levers, slow opening and closing. Bulletin 1081.

337

SARCO SAVES STEAM

IMPROVES PRODUCT QUALITY AND OUTPUT

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Represented in Principal Cities

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SARCO CANADA, LTD., TORONTO 8, ONTARIO

NEW PRODUCTS summarized for your convenience

Edited by M. E. Heniken

SPEED REDUCER offers output speeds from 12 to 110 rpm

The No. 7 Torque-Arm Speed Reducer is a double-reduction, shaft-mounted unit with capacity to 43 hp. This is 59 per cent greater capacity than company's No. 6 in the same series. Like previously announced models the No. 7 is anchored with a torque-arm which fastens to any fixed object. A turnbuckle is provided for quick, easy adjustment of belt tension. *Dodge Mfg. Corp., Mishawaka, Ind.*

POWERED SWEEPER is economical unit for large area sweeping

The Yard Bird is a low-cost sweeper designed as an attachment for any fork lift truck of 1500-lb capacity and up. The sweeper, operated by the truck operator, can clean indoors and out-

doors as much as 80,000 sq ft per hr, manufacturer states, when the truck is traveling at 5 mph.

The Yard Bird has its own self-contained spray system for dust control. A 6 hp gasoline engine turns at 2400 rpm, but an integral clutch reduction unit and sprockets step down brush revolutions to 164 rpm. The sweeper is of the pick-up type, with brush whisking dirt and refuse into a floating dust pan. By entering the forks of the lift truck at an angle, the Yard Bird can be used for snow removal, whirling snow off to one side for fast clearance. A 30-gal water tank for the sprinkler system is built in as an integral part of the Yard Bird hood. *Little Giant Products, Inc., 1530 N. Adams St., Peoria, Ill.*

CIRCULAR CHART CONTROLLER for time-temperature schedules

This electronically-operated circular chart instrument has been developed to control industrial processes according to time-temperature schedules. In instances where both time and temperature control are important, it has an integral-program cam mechanism which is designed to automatically position the instrument control point in accordance with predetermined program.

This instrument combines within a single case, measurement and recording on a 12-in. chart; automatic positioning of set point index as directed by a transparent program cam; and automatic program control of the variable. Standard Brown continuous balance system is used for measurement, and available in both electric and pneumatic control. An optional accessory is an adjustable Micro Switch assembly for de-energizing cam drive motor, shutting down equipment, operating signal lights. *Brown Instruments Div., Minneapolis-Honeywell Regulator Co., Wayne & Windrim Aves., Philadelphia 44, Pa.*

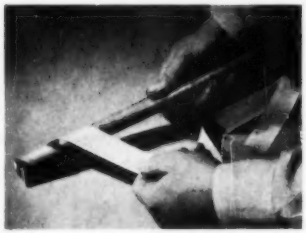
MAGNESIUM CEMENT is announced as durable flooring material

The combination of magnesium chloride and magnesium oxide with certain fillers and fine aggregates is said to produce a cement that sets within a few hours and forms a hard, dense, durable mass with excellent characteristics as a flooring material. This cement, composed of hard rock fractures bedded in a matrix of mineral and vegetable fibres, is trade-named Magna-Crete and supplied in dry form to be mixed on the job to a mortar consistency, then spread, leveled and troweled.

Among advantages claimed for Magna-Crete are comparatively lightweight, good bonding, resistance to oils and greases, granite hard surface, silence, moderate price range, long service, low maintenance costs. A bulletin gives prices. *Flash-Stone Co., Inc., 3723 Pulaski Ave., Philadelphia 40, Pa.*

HEATING ELEMENT is film type in flexible tape form

Electrofilm Flexible Tape Elements dissipate 2.5 w per sq in., according to company, and recommended maximum temperature is 300 F. The new flexible



element comes in both 115 and 27 v, the latter furnished in both 28 in. and 10 ft lengths, and the 115 v tape is available in 10 ft lengths. The tape is 1½ in. wide—1 in. heating surface.

These flexible elements are suggested for applications to cylinders and tubes, and the material is sold as a package which also includes covering insulation, busses and bussing material. The 10-ft kit lists for $9.85; the 28-in. kit, $4.85. *Electrofilm Corp., 7116 Laurel Canyon Blvd., North Hollywood, Cal.*

GLARE REDUCING GLASS provides filtered daylight for buildings

A new member of this manufacturer's heat-absorbing and glare-reducing glass family, Aklo Fine-Tex is a patterned glass and will be available in ⅛ and

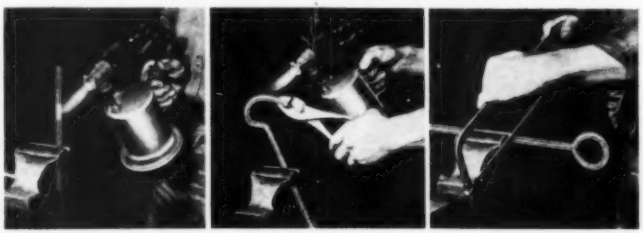
(Continued on page 142)

THREADED STEEL ROD for repair, installation and construction work

Redi-Bolt is intended to save time and money on jobs requiring long bolts or rods, or bolts of special shape. It comes in straight 36 in. lengths and in six diameters from ¼ to ¾ in., precision-threaded the full length. It is made of cold drawn steel, with a special coating to protect against rust.

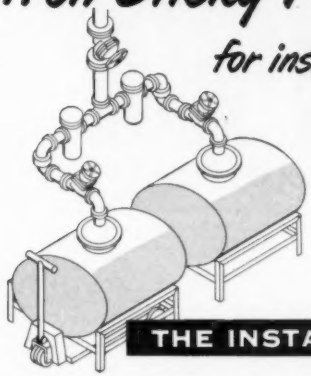
Long straight bolts and adjusting rods can be made quickly by hacksawing Redi-Bolt to size and fitting with standard nuts. Or, after heating the rod with a blowtorch, it can be bent into U-bolts, L-bolts, eye-bolts or other shapes and the part is ready for use.

Redi-Bolt can be used to hang overhead electrical equipment, steam and water pipes, power packs, unit heaters and conveyor systems. It can be used to mount power panels, transformers and ducts, and to anchor machinery, walls and shelves. It also has many repair and construction applications. *Redi-Bolt, P. O. Box 6102, Chicago, Ill.*



Do Your Valves Fit Your Job This Well?

... on Sticky Fluid for instance



THE INSTALLATION

Crane Diaphragm Valves on air pressurized liquid latex piping service in paint factory, Adams & Elting Division, The Glidden Company, Chicago.

THE HISTORY

Conventional valves formerly used in this service were hindered by exposure of working parts to the line fluid. The sticky latex would accumulate in the bonnet and stem threads, freezing the stem, and making valve operation difficult or impossible. With 10 or more operating cycles required daily, the plant faced considerable valve trouble and maintenance expense.

Both trouble and maintenance cost were completely eliminated by replacing with Crane Diaphragm Valves. Their fully sealed bonnet keeps the latex out of working parts. They operate smoothly and do not freeze or stick. So well is the customer satisfied with Crane Diaphragm Valves, more have been ordered for new latex lines.

VALVE SERVICE RATINGS

OPERATION:
Easy - No sticking

SUITABILITY:
Fluid can't get into bonnet

MAINTENANCE COST:
None to date - None indicated

SERVICE LIFE:
No sign of wear

OPERATING RESULTS:
Production delays stopped

PRICE:
In line - No premium

AVAILABILITY:
Stock item in Crane line

THE VALVE

Crane No. 1610 Iron Body Packless Diaphragm Valves featuring separate disc and diaphragm. Neoprene diaphragm acts as bonnet seal only; isn't pinched or stressed when valve is closed. Conventional type seating makes positive closure even should diaphragm fail. High flow capacity Y-pattern body has non-restricting interior design. Available unlined or fully Neoprene lined. Consult your Crane Catalog or Crane Representative.

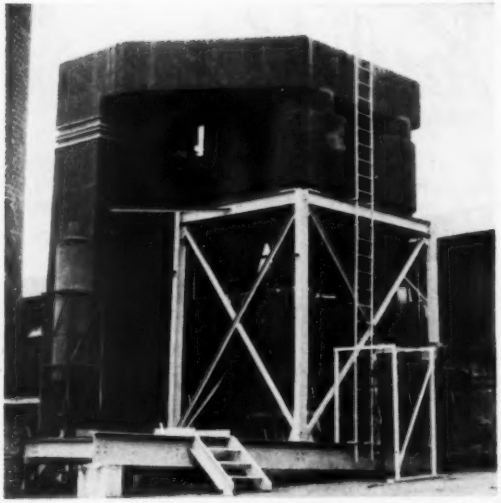
The Complete Crane Line Meets All Valve Needs. That's Why
More Crane Valves Are Used Than Any Other Make!

CRANE VALVES

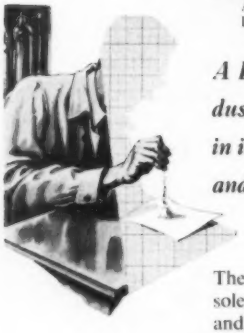
CRANE CO., *General Offices:* 836 S. Michigan Ave., Chicago 5, Illinois
Branches and Wholesalers Serving All Industrial Areas

VALVES • FITTINGS • PIPE • PLUMBING • HEATING

Fly-ash collection can pay its own way



After an exhaustive study, engineers at a Southern paper mill selected Buell van Tongeren Cyclones for their three pulverized-coal-fired boilers.



A Buell industrial 'dust' man can show you how dust collection pays off in improved product, higher employee morale and better community relations

The Buell organization of industrial 'dust' men is devoted solely to the design and construction of dust recovery and dust collection equipment that will most efficiently and economically solve your plant's specific stack dust problem.

For more than 18 years we have been doing just this for all American industry. Every Buell installation is a custom designed system, engineered to hold stack dust discharge down to the practical limits which assure new profits, improved product and/or process, better plant-community relations, higher levels of employee morale.

For full information about Buell's ***3 basic systems*** of dust collection, and how one can be applied to the solution of your stack dust problems, write today. Ask for the new informative bulletin titled, "The Collection and Recovery of Industrial Dusts." Do it now. Buell Engineering Co., Dept. 14-E, 70 Pine Street, New York 5, N. Y.

ELECTRIC CYCLONIC ®

HIGH EFFICIENCY CYCLONES • ELECTRIC PRECIPITATORS
TYPE 'LR' COLLECTORS • LOW DRAFT LOSS COLLECTORS
SPECIAL PURPOSE COLLECTORS • DUST HOPPER VALVES

buell

ENGINEERED EFFICIENCY IN ***DUST COLLECTION***

REDUCTION OF ROLLING MILL OPERATION COSTS AIDED BY

STERLING SPEED-TROL!

Northwest Steel Rolling Mills selected Speed-Trols to drive special machines for roll production. Speed-Trol's positive pulley adjustment assures even cutting at any speed. More even grooving resulted in better operating rolls and higher operator morale... this equipment reduced roll ragging time from two weeks to 8 hours and groove milling time from one week to 8 hours per set of rolls. Wm. C. Crowe, Chief Roll Designer, also reports substantial savings in tools and grinding wheels.

STERLING SPEED-TROL GIVES YOU VARIABLE SPEED CONTROL NECESSARY FOR:

EQUIPMENT ADAPTATION TO: Sequence synchronization—operators' abilities—load variations due to differences in quantity, quality, weight, size, tension, hardness or shape of material to be processed, machined, conveyed, blended, mixed, etc.

PROCESS CONTROL OF: Temperature—viscosity—level—pressure—flow—etc.

TIME CONTROL OF: Baking—drying—heating—cooking—pasteurizing—soaking—chemical action—etc.

With Speed-Trol you get the maximum in production, plant efficiency, quality and profit.

OTHER STERLING ELECTRIC POWER DRIVES:

- **STERLING SLO-SPEED (GEARED) MOTORS**
- **STERLING KLOSD AND KLOSD-TITE (NORMAL SPEED) MOTORS**

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70 ILLUSTRATIONS showing how Sterling Electric Power Drives reduce production costs. Write for Bulletin No. **A106**

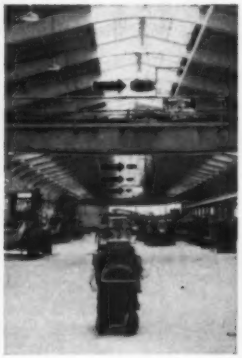
STERLING ELECTRIC MOTORS

Plants: New York City 51; Van Wert, Ohio; Los Angeles 22; Hamilton, Canada; Santiago, Chile.

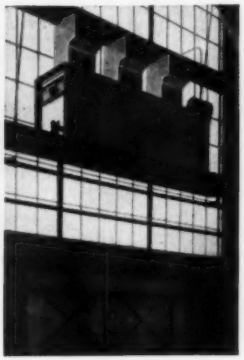
Offices and distributors in all principal cities.

WHAT'S YOUR FACTORY HEATING PROBLEM?

High Ceilings



Conveyors or Craneways



Door or Window Drafts

Remote Space to be Heated

TRANE unit heaters— 6 of them—have the answer!

To solve the many special problems of factory heating takes more than one kind of unit heater. It actually takes six—and TRANE builds all of them.

The TRANE Projection Heater handles high ceilings, craneways. For ventilation, use the Torridor, or the TRANE Powered Ventilating Heater. Doors and windows can be blanketed with a TRANE Horizontal Unit Heater. For lobbies there's the TRANE Force-Flo Heater. If gas is available there's the TRANE Gas Fired Unit Heater.

These six TRANE Unit Heaters, together with two exclusive patented diffusers, enable you to find the right combination for *your* factory heating problem.

Matched for perfect service with TRANE Unit Heaters are TRANE Steam Specialties; bucket, float and thermostatic traps for high and low pressures.

See your nearest TRANE sales engineer or write TRANE, La Crosse, Wis.

TRANE Projection Heater

TRANE Torridor

TRANE Model H Unit Heater

TRANE Gas Fired Unit Heater

TRANE Force-Flo Heater

TRANE Powered Ventilating Heater

TRANE Wall Fin

TRANE Bucket and Float Traps

TRANE

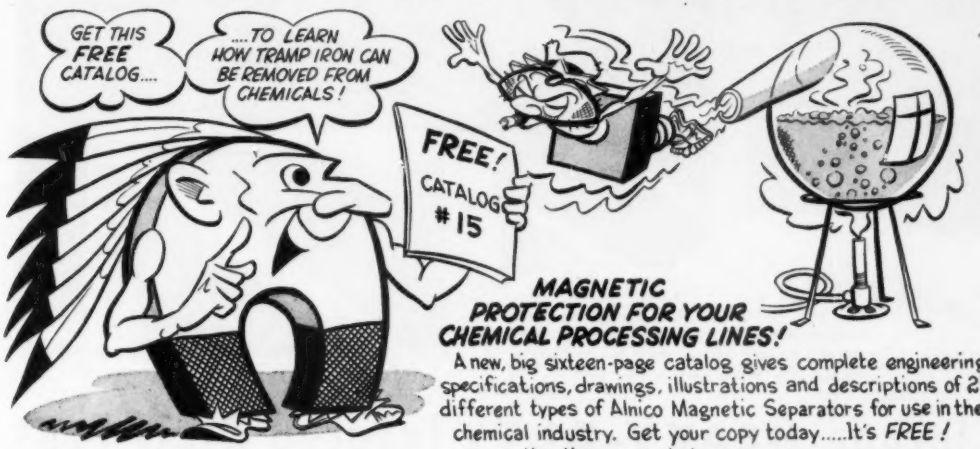
THE TRANE COMPANY, LA CROSSE, WIS.
Eastern Mfg. Division, Scranton, Pa.
Trane Company of Canada, Ltd., Toronto
Offices in 80 U.S. and 14 Canadian Cities

MANUFACTURING ENGINEERS OF HEATING, VENTILATING AND AIR CONDITIONING EQUIPMENT

ERIEZ MAGNETIC ATTRACTIONS

MR. T.I.

ERIEZ MANUFACTURING CO., ERIE, PA., U.S.A. • PRODUCERS OF MAGNETIC SEPARATORS



MAGNETIC PROTECTION FOR YOUR CHEMICAL PROCESSING LINES!

A new, big sixteen-page catalog gives complete engineering specifications, drawings, illustrations and descriptions of 25 different types of Alnico Magnetic Separators for use in the chemical industry. Get your copy today.....It's *FREE!* Use the coupon below.

DO YOU KNOW... that *ERIEZ* designed every major type of permanent magnetic separator on the market today? These include Alnico Magnetic Pulleys, Drums, Pipeline Traps, Conveyor Magnets, Pipe Rolls, Micro-Magnetic Separators, Magnetic Humps, Industrial Plate-Type Magnets and the new revolutionary ATOMagnets! *ERIEZ* research can help you too!

SEVERAL LARGE SOAP COMPANIES use *ERIEZ* plate-type ATOMagnets in a round pipe magnetic separator or pipeline trap to remove metal particles from chips or soap in the liquid stage. Prevention of product contamination is the objective. Success is the result.

ERIEZ Manufacturing Company, 204 State Street, Erie, Pa.

My Contamination or Separation Problem is: _____

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Please Send Me the *FREE* Catalog #15

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Company Name _____

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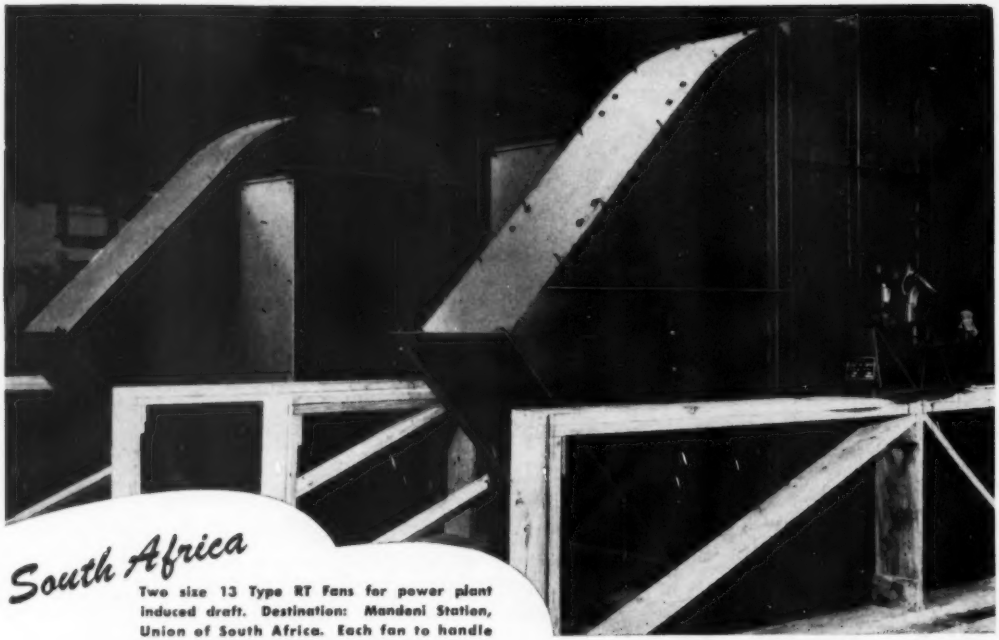


South Africa

Two size 13 Type RT Fans for power plant induced draft. Destination: Mandeni Station, Union of South Africa. Each fan to handle 48,300 c.f.m. of flue gases at over 500° F.

Clarage HEAVY-DUTY Induced Draft Fans Travel a Long Way to Make Good

SEND FOR CATALOG 901

Type RT Fan specifications and equipment arrangements for induced draft, forced draft and industrial air handling services are covered in this catalog. Write for your copy today.

Shipped five months ago, these Type RT Fans are now in operation almost halfway around the world from Clarage service . . .

But whether you are 50 miles from us — or 10,000 — makes little difference when you install Type RT fan equipment.

Every RT fan part — wheels, bearings, shaft, housing — is HEAVY-DUTY construction. You are not likely to need repair parts for a long time to come!

That is why this excellent mechanical draft equipment is now operating in 43 states and 15 foreign countries.

YOU CAN RELY ON

CLARAGE

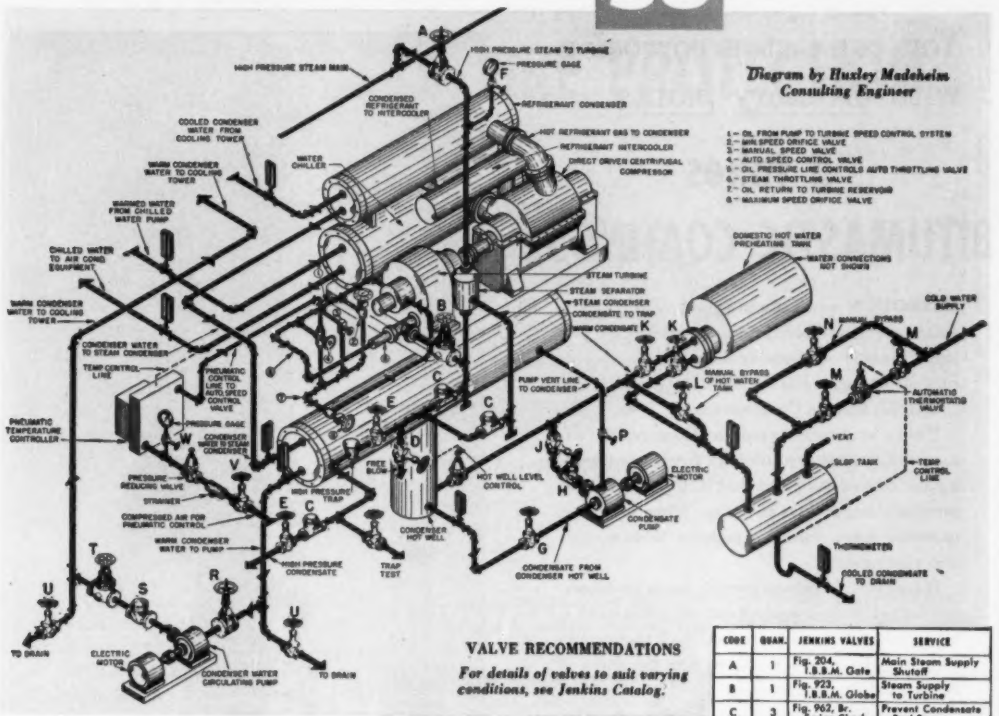
HEADQUARTERS FOR AIR HANDLING & CONDITIONING EQUIPMENT

Clarage Fan Company 611 PORTER STREET *KALAMAZOO, MICH.*

SALES ENGINEERING OFFICES IN ALL PRINCIPAL CITIES

IN CANADA: Canada Fans, Ltd., 4285 Richelieu St., Montreal

JENKINS PRACTICAL PIPING LAYOUTS 58



VALVE RECOMMENDATIONS

For details of valves to suit varying conditions, see Jenkins Catalog.

CODE	QUAN.	JENKINS VALVES	SERVICE
A	1	Fig. 204, I.B.B.M. Gate	Main Steam Supply Shutoff
B	1	Fig. 923, I.B.B.M. Globe	Steam Supply to Turbine
C	3	Fig. 962, Br. Swing Check	Prevent Condensate Backflow
D	2	Fig. 970, Br. Globe	Free Blow and Trap Test
E	2	Fig. 280, Br. Gate	Trap Shutoff
F	1	Fig. 703, Br. Needle	High Pressure Steam Gage
G	1	Fig. 370, Br. Gate	Condensate Pump Shutdown
H	1	Fig. 92, Br. Swing Check	Prevent Condensate Backflow
J	1	Fig. 106-A, Br. Globe	Condensate Pump Control & Shutoff
K	2	Fig. 370, Br. Gate	Preheat Water Tank Shutoffs
L	1	Fig. 106-A, Br. Globe	Preheat Tank By Pass
M	2	Fig. 370, Br. Gate	Cold Water Shutoff Valves
N	1	Fig. 106-A, Br. Globe	Manual By Pass
P	1	Fig. 741-G, Br. Needle	Condensate Vent
R	1	Fig. 253, I.B.B.M. Gate	Condensate Water Shutoff
S	1	Fig. 339, I.B.B.M. Swing Check	Condenser Water Pump
T	1	Fig. 162, I.B.B.M. Globe	Condenser Water Flow Control
U	2	Fig. 106-A, Br. Globe	Drain Valves
V	1	Fig. 106-A, Br. Globe	Prevent Air Supply Shutoff
W	1	Fig. 741-G, Br. Needle	Pressure Gage Control

How to plan

CONNECTIONS FOR STEAM TURBINE DRIVEN CENTRIFUGAL REFRIGERATION COMPRESSOR

As shown in the diagram, steam from high pressure mains passes through an automatically controlled steam throttling valve which varies turbine speed in accordance with the load on the air conditioning system.

Control is based upon the temperature of the chilled water leaving water chiller. A pneumatic controller, positioned by a temperature element in the chilled water discharge pipe, controls air pressure on a diaphragm valve in the oil pressure system.

This valve controls the pressure on the steam throttling valve, changing speed of the turbine in accordance with air conditioning load. Exhaust steam from turbine enters the steam condenser which maintains a very low back pressure (26″ to 28″ vacuum).

Where district steam is used, it is generally uneconomical to return the condensate to the boilers; condensate is merely discharged to the sewer after some of the heat has been used to preheat domestic hot water for the building. Local codes specify maximum heat of discharge.

Jenkins Valves listed are rated for an assumed high steam pressure of about 160 psi, and the condensing water pressure of about 200 psi.

Consultation with accredited piping engineers and contractors is recommended when planning any major piping installations.

TO SIMPLIFY PLANNING

To save time, to simplify planning, to get all the advantages of Jenkins specialized valve engineering, select all the valves you need from the Jenkins Catalog. It's your best assurance of lowest cost in the long run. Jenkins Bros., 100 Park Ave., New York 17; Jenkins Bros., Ltd., Montreal.

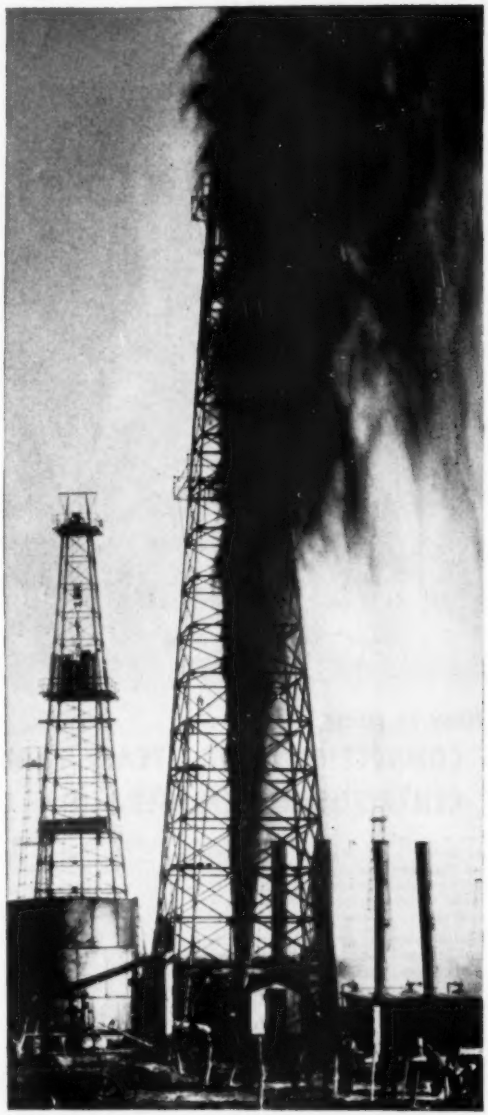
COMPLETE DESCRIPTION AND ENLARGED DIAGRAM OF THIS LAYOUT FREE ON REQUEST. Includes additional detailed information. Simply ask for Piping Layout No. 58.

JENKINS
LOOK FOR THE DIAMOND MARK
VALVES
SINCE 1864
TRADE JENKINS MARK
Jenkins Bros.

You can't stop a gusher with a bottle cap

You can't stop corrosion with ordinary paints . . .

it takes BITUMASTIC COATINGS!



CORROSION can't be stopped by ordinary paints or conventional protective coatings. They can't protect surfaces against the ravages of rust for any appreciable length of time.

But Bitumastic Coatings can!

Unlike maintenance paints, Bitumastic® Protective Coatings are specially formulated from a base* of coal-tar pitch that is, for all practical purposes, impervious to water. When you keep moisture away from an exposed surface, you *stop* corrosion.

Bitumastic Coatings provide an extra-tough, extra-thick barrier against corrosive elements—a barrier that is impenetrable. And these coatings provide up to 8 times the film thickness of conventional paint coatings.

Bitumastic Coatings stop corrosion caused by moisture—acid fumes—alkaline fumes—corrosive soil—salt air—heat.

*Hi-Heat Gray contains a metallic base.

There are 6 Koppers Coatings—formulated to control corrosion of metal and deterioration of concrete. Use the coupon for full information.

SEND FOR SET OF FREE BOOKLETS!

Koppers Company, Inc., Tar Products Division
Dept. 523-T, Pittsburgh 19, Pa.

Please send me, without charge or obligation, your booklets on corrosion prevention.

Name.....

Address.....

City.....Zone....State.....

KOPPERS BITUMASTIC PROTECTIVE COATINGS
REG. U.S. PAT. OFF.

SOLD THROUGH INDUSTRIAL DISTRIBUTORS

KOPPERS COMPANY, INC., Tar Products Division, Dept. 523-T, Pittsburgh 19, Pa.

DISTRICT OFFICES: BOSTON, CHICAGO, LOS ANGELES, NEW YORK, PITTSBURGH, AND WOODWARD, ALA.

SHIELD *of* MODERN FIRE PROTECTION

"headquarters for the finest"

Foremost design, experienced engineering, quality materials, expert workmanship and operating superiority are all bywords of the C-O-Two Fire Equipment Company... originators of the world famous C-O-TWO Squeez-Grip Carbon Dioxide Type Fire Extinguishers.

C-O-TWO, being specialists in modern fire detecting and extinguishing equipment for many years, are constantly striving to develop new and improved types of fire protection equipment that will render highly efficient results in safe-guarding life and property from the ravages of fire.

With C-O-TWO Fire Protection Equipment, simplicity, practicability, longevity and minimum maintenance are built-in features that guarantee fast, positive action the instant fire strikes. Furthermore, extensive skill and high quality standards, together with approvals such as the Underwriters' Laboratories, Inc., Factory Mutual Laboratories, Armed Forces and Government Bureaus assure you of the finest in modern fire protection equipment.

Among the many types of up-to-date fire protection equipment manufactured by C-O-TWO, the following comprise the principal items on the market today:

- **carbon dioxide type hand and wheeled portable fire extinguishers**
- **dry chemical type hand and wheeled portable fire extinguishers**
- **carbon dioxide type hose rack and hose reel fire extinguishing units**
- **built-in high pressure carbon dioxide type fire extinguishing systems**
- **built-in low pressure carbon dioxide type fire extinguishing systems**
- **built-in smoke fire detecting systems**
- **built-in heat fire detecting systems**
- **high pressure carbon dioxide cylinder recharging equipment**

So, with current expensive delayed replacements, why not let an expert C-O-TWO Fire Protection Engineer help you now in planning modern, economical, fully approved fire protection facilities for your various properties. Our experience is at your disposal . . . no obligation of course. Get the facts today!

C-O-TWO FIRE EQUIPMENT COMPANY

NEWARK 1 • NEW JERSEY

Sales and Service in the Principal Cities of United States and Canada

Affiliated with Pyrene Manufacturing Company

MANUFACTURERS OF APPROVED FIRE PROTECTION EQUIPMENT

Squeez-Grip Carbon Dioxide Type Fire Extinguishers • Dry Chemical Type Fire Extinguishers • Built-In Smoke and Heat Fire Detecting Systems Built-In High Pressure and Low Pressure Carbon Dioxide Type Fire Extinguishing Systems

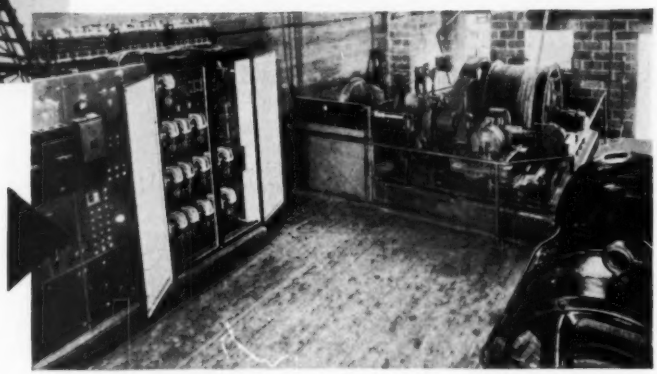
At the World's Largest Slag Plant—owned and operated by Birmingham Slag Company, Birmingham, Alabama.

AUTOMATIC CONTROL

Does What Human Hands Couldn't Do

●

Production schedule, averaging one trip per minute, now easily maintained.



New EC&M FREQUENCY RELAY Controller slows bucket by plugging to prevent overtravel and derailment of cars. Power occasionally re-applied as trip ends.

Previously, manual jogging by skilled operator could not always avert delays, even though down-car was aided by engaging counterweights to offset over-hauling effect of car going over the knuckle at the top.

THE PROBLEM:

How to govern speed *from the ground level* as the loaded bucket reaches the top, levels out and quickly tips to dump. The motor load, a maximum driving value on the upgrade, falls off as the bucket levels out, and changes quickly to maximum *overhauling* as the bucket jackknifes to dump. An operator has little time to "feel" or judge the motor load under such swift or sudden changes.

THE SOLUTION:

EC&M Frequency Relays respond accurately to the slip-frequency of the wound-rotor hoist motor. As a loaded bucket reaches the top, plugging is automatically applied by the limit switch and the bucket reaches the end of travel with motor speed reduced to 17% or less. An empty bucket going over the knuckle operates in like manner. With a *heavily loaded* bucket, power may be re-applied after plugging but the motor seldom speeds up to a point where a second "plug" is required before the trip is ended. EC&M Frequency Relays provide a simple, accurate method of controlling plugging and accelerating contactors for smooth operation of the a-c skip hoist.

Contacts Lasted 3 Months—No Replacement Now in Over 2 Years

Previously: frequent jogging handling heavy currents accelerated contact wear. Since converting to automatic operation by Frequency Relays, movements are a minimum and examination after 2 years indicates no replacement will be needed for some time.

Write for your copy of EC&M Frequency Relay Controller Bulletin 9306-SK.

THE ELECTRIC CONTROLLER & MFG. CO.

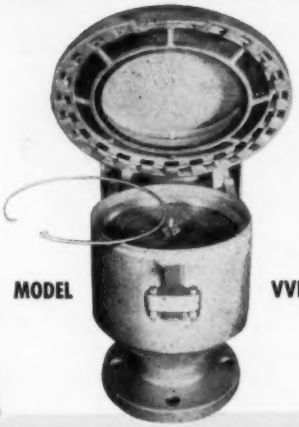
2698 EAST 79TH STREET • CLEVELAND 4, OHIO

Positive Pressure Relief!

Efficient Fire Protection!

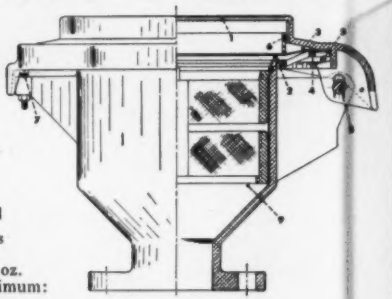
Lower Maintenance Costs!

with the BS&B COMBINATION VENT VALVE FLAME ARRESTER



MODEL VVFA

The BS&B Model VVFA is a compact valve assembly that gives you many advantages. Its patented cantilever type arrangement of a synthetic rubber gasket eliminates metal-to-metal seating and provides a tight seal that increases in tightness until the pressure rises to the dead weight setting of the bonnet, thus assuring continued positive reseating. This gives you high vapor conservation and greater economy in operation. The arrester bank is housed in the valve body. Snuffing action is automatic. The arrester bank can be removed for cleaning or replacement without taking the valve out of service since the valve bonnet does not have to be removed. The cantilever type gasket can also be easily removed from the bonnet.



MATERIAL SPECIFICATIONS

Bonnet: cast aluminum
Body: cast iron
Retaining ring: cast aluminum
Vacuum ring: steel
Plug: synthetic rubber
Arrester bank: rolled corrugated aluminum
Flange: 125# A.S.A. standard

Sizes: 2, 3, 4 and 6-inch sizes available
Vacuum Setting: 0.5 oz. to 2 oz.
Pressure Setting: 0.5 oz. minimum: 16 oz. maximum all sizes

Note: Available in other materials of construction on special order.

BS&B Vent Valve—Model VVH

Contains all features of Model VVFA with exception of arrester bank. Can be used as a secondary relief valve with higher setting. Also as primary relief valve on non-flammable materials. The larger sizes of Model VVH can be used as a manway, thus saving an additional tank opening. Material specifications are the same as Model VVFA.

OPERATION DATA — MODEL VVFA Valve seat (2) is sealed by rubber gasket (3), vacuum ring (6) and internal pressure. As internal pressure approaches valve setting, patented cantilever type plug is disengaged from valve seat and bonnet (1) rises. Under vacuum conditions, atmospheric pressure is imposed to underneath side of plug. This permits "inbreathing" when pressure approaches 0.5 oz. setting of vaccum ring. A web-type support (4) holds plug in place. The valve also includes retaining ring spring (5), bumper spring (7), hinge (8) and arrester bank (9).

Ask Your Tank Manufacturer for BS&B Vent Valves on Your Equipment! To get greater economy of operation, ask to have the BS&B Combination Vent Valve-Flame Arrester installed on your equipment. Our engineers will work with your fabricators to meet your particular requirements.

ENGINEERING STUDY OF YOUR REQUIREMENTS You are not obligated in any way when a BS&B engineer makes an analysis of your properties. Perhaps his recommendations will show you how to get more efficient, economical, safe operation.

NOW AVAILABLE Bulletin No. 601, which gives complete information on this equipment. **Write for your copy today.**

SAFETY BS&B HEADS

BLACK, SIVALLS & BRYSON, INC.

DEPT. 3-51, 7500 E. 12TH ST. KANSAS CITY 3, MISSOURI

Tailor-made for HOT•COLD service...

Fiberglas* Dual-Temp Pipe Insulation

Problem: With more and more buildings designed for year 'round temperature control, a piping system often must carry hot water one season and cold water another. That calls for good insulation *plus* an effective vapor barrier.

Answer: New Fiberglas Dual-Temperature Pipe Insulation has its own *integral* vapor barrier, a special laminated jacket with moisture transmission of less than .01 perm! *No separate application needed.* Jacket flap seals longitudinal joint, and strips of same material seal transverse joints. Insulation is Fiberglas PF (pre-formed) material, outstanding for high thermal efficiency and fast, easy application. Fiberglas Dual-Temperature Pipe Insulation may be used on ice water, brine and other indoor lines in continuous low-temperature service.

You can count on these unique features of Fiberglas Industrial Insulations to produce top results, in less time, at lower costs:

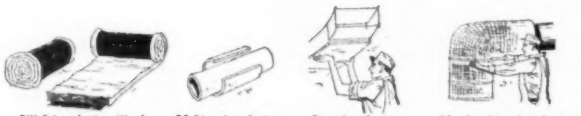
- High insulating value
- Light in weight
- Easy to cut and apply
- Economically priced
- Ageless, rotproof
- Non-corrosive
- Low moisture pickup
- Will not shrink

For local source of supply, see the yellow pages of your phone book. Or contact the nearest Fiberglas branch office. OWENS-CORNING FIBERGLAS CORPORATION, Dept. 95-E, Toledo 1, Ohio.

OWENS-CORNING
FIBERGLAS

INDUSTRIAL INSULATIONS

...Where Heat or Cold Must be Controlled!



TW-F Insulating Wool | *PF Pipe Insulations* | *Duct Insulations* | *Blanket Pipe Insulations*

Block Insulations | *Metal Mesh Blankets* | *Low-Temp. Insulations* | *Insulating Cement*

*Fiberglas is the trade mark (Reg. U. S. Pat. Off.) of Owens-Corning Fiberglas Corporation for a variety of products made of or with fibers of glass.

BUY HALLOWELL® BASIC

Model 600 with steel top, 6' long, 29" wide, and standing 29½" high.

...ADD ACCESSORIES FOR EXTRA CONVENIENCE

Buy BASIC and *custom build* your HALLOWELL Work Benches to fit your own requirements.

It's a simple matter to add standard unit shelves, backboards, end pieces, drawer tiers and utility cabinets to give your HALLOWELL bench even greater utility value. And because lengths, heights and widths are standard, too, you can make up a continuous bench of any length.

Let us tell you about sturdy, long-lasting HALLOWELL Work Benches and their *custom-built* flexibility with standard units. Write for descriptive literature. STANDARD PRESSED STEEL CO., Jenkintown 26, Pa.

HALLOWELL SHOP EQUIPMENT DIVISION

SPS
JENKINTOWN PENNSYLVANIA

WORK BENCHES • CABINET BENCHES • POSTURE STOOLS AND CHAIRS
FOREMAN'S DESKS • TOOL STANDS • HAND AND PLATFORM TRUCKS

What a Day-Brite reflector goes through to get its porcelain enamel finish

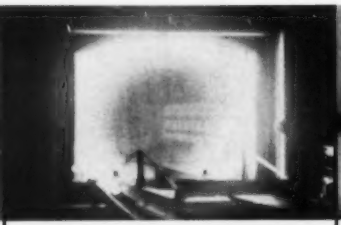
Let's follow a Day-Brite industrial reflector down the production line from start to its "decidedly better" finish.

The reflector is die-formed from one piece of special enameling iron which has a low carbon content and good surface texture.

Cleanliness is absolutely vital to good enameling. The formed reflector is given a pickling bath which chemically cleans and etches the surface to assure a tight bond with the porcelain enamel.

Meanwhile, a special Day-Brite perfected formula is ground in huge mills to a thin, creamy suspension, known as "slip." This mixture is screened and magnetically separated to remove even the tiniest particles of metal that may be present.

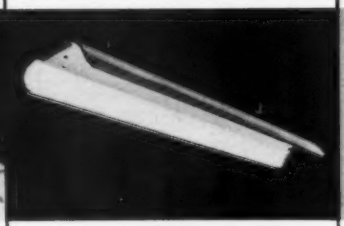
THE GROUND COAT is applied by dipping the reflector into the procelain "slip." After dipping, the reflector goes through a gas heated dryer where the "slip" dries to a chalk-like coating.



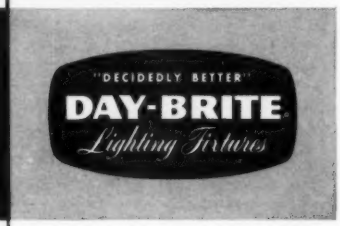
UNDER INTENSE HEAT of 1550°F, the ground coat is "fired on" the metal in Day-Brite's giant electric ovens. The reflector is now ready for the final coat of porcelain enamel.

THE FINISH COAT is sprayed on—gray on the top; white on the inside surface. Again the "slip" must be dried on the reflector—so back it goes for another slow trip through the gas dryer.

EDGES ARE WIPED to the base coat, reducing the danger of chipping and crazing at these points. After wiping, the finish coat is "fired on" in the electric ovens; then undergoes final inspection.



THE FINISHED REFLECTOR: A gleaming, sparkling beauty! Its everlasting porcelain enamel finish is flint-hard, acid-resistant, color-fast—with a guaranteed reflection factor of 82% or more.



DAY-BRITE
RLM

the Day-Line®

a "decidedly better" product of Day-Brite Lighting, Inc., 5439 Bulwer Ave., St. Louis 7, Mo.

In Canada: Amalgamated Electric Corp., Ltd., Toronto 6, Ontario

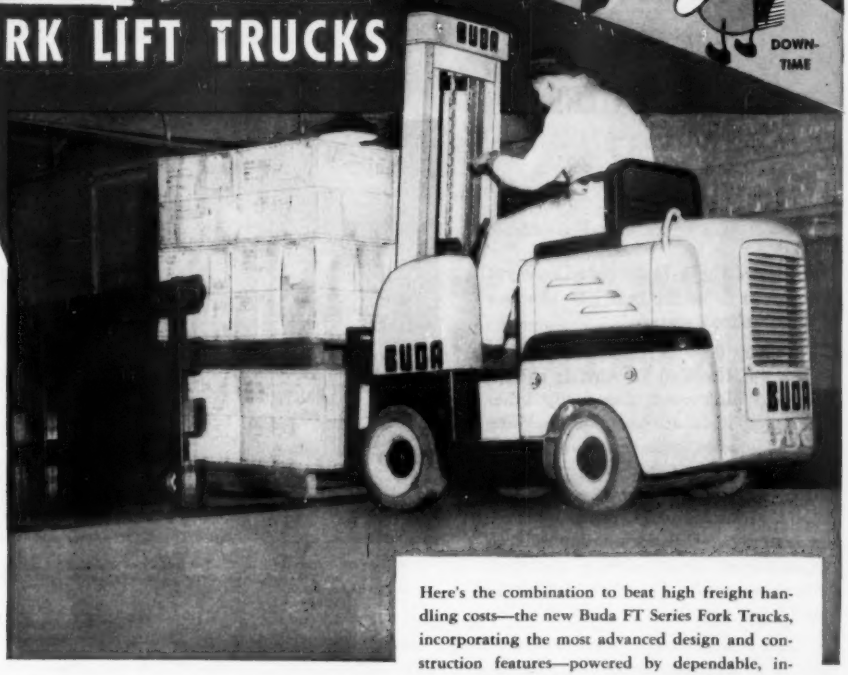
Open or closed-end reflectors—for two or three 40-watt or two 85-watt fluorescent lamps—also available for two or three 75-watt slimline lamps. For single unit or continuous installations. Vibration-proof TURRET* sockets. Available with apertures for upward component. Carries the RLM label and Underwriters' approval. Full information on request.

*® G. E. Co.

238

HIGH MATERIAL HANDLING COSTS GOT YOU CORNERED?

get **BUDA** Diesel powered **FORK LIFT TRUCKS**



Here's the combination to beat high freight handling costs—the new Buda FT Series Fork Trucks, incorporating the most advanced design and construction features—powered by dependable, industry proved Buda Diesels. You've never seen trucks that maneuver so quickly and surely, carrying full capacity loads, as these new Budas. Remember—they're Buda Diesels powered to run longer . . . at lower cost . . . with less maintenance and downtime.

Get complete details from your Buda Materials Handling Distributor today. Write for Bulletin 1570. The Buda Company, Harvey, Illinois.

★ **LOWER FUEL COSTS**—50 to 60% savings

★ **LESS MAINTENANCE**—Heavy duty construction; fewer parts

★ **LONGER OPERATION**—Buda Diesels run thousands of hours before overhaul

★ **SAFER**—Use less volatile fuel with complete combustion, resulting in a safe, non-toxic exhaust

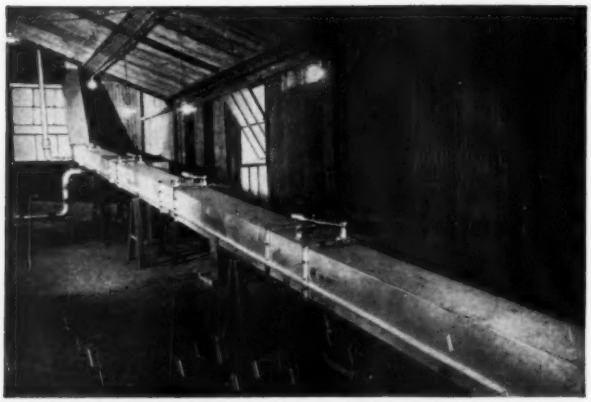
BH-42

BUDA

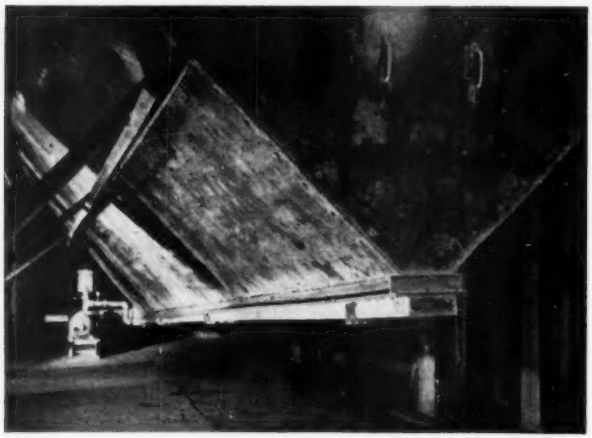
The Line With All 3 For Diversified Handling

Manufacturers of Material Handling Equipment, Lifting Jacks, Maintenance of Way Products, Earth Drills and Diesel and Gasoline Engines

AIRSLIDE MAKES "EASY-GOING" FOR PULVERIZED MATERIALS



F-H Airslide Conveyor, enclosed type, conveys raw materials from preliminary grinding mills and delivers it, through three side-discharge valves, to bin below. Air piping from 1½ hp. fan is at far end of Airslide.



F-H Airslide, open type, installed in bottom of raw-material storage and blending bin at Giant Portland Cement Company. The 5-hp. blower in the background furnishes the necessary air.

Once again, the F-H Airslide Conveyor has proved to be the best way to move dry, pulverized material.

The Giant Portland Cement Company, Egypt, Pa., installed an Airslide system . . . and discovered, like many other companies, that it had cut handling costs. Hazards to workmen have been eliminated. Power costs are negligible. There are no breakdowns and costly repairs. Raw materials, aerated to flow like water, travel from grinding mills to bin, and from bin to elevator at rate of 90 tons an hour. Power requirements? One blower and one fan: total 6½ hp.

The side-discharge valves installed in the Airslide above the bin may be set either to direct entire material flow through one spout, or divert any portions of the material stream to obtain a desired distribution to the bin below the floor.

The Airslide Conveyor is just about tops in simplicity. There is no need for lubrication or costly down-time. There are no moving parts in the conveyor itself. An Airslide can't be equalled for flexibility in plant design.

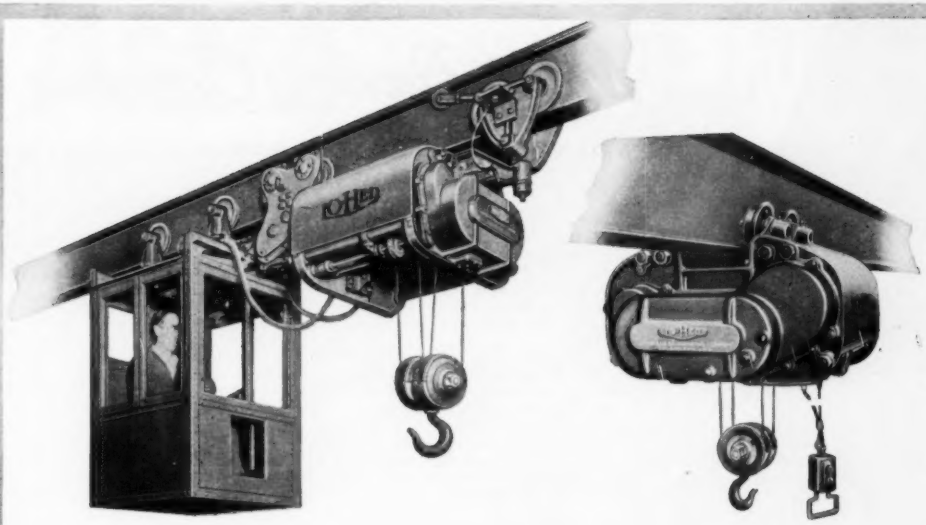
If your conveying costs are cutting into profits, call in a Fuller representative. He'll survey your plant and submit recommendations without obligation on your part. His advice may well be your key to more efficient and profitable operation.

FULLER COMPANY, Catasauqua, Pa.
120 So. LaSalle St., Chicago 3
420 Chancery Bldg., San Francisco 4

DRY MATERIAL CONVEYING SYSTEMS AND COOLERS—
COMPRESSORS AND VACUUM PUMPS—
FEEDERS AND ASSOCIATED EQUIPMENT

fuller

FH-13



In hoists of capacities up to 12 tons

GET THESE LO-HED EXTRAS!

WHATEVER SIZE HOIST you want up to 12 tons capacity, you also want the time- and money-saving extras that come in Lo-Hed Hoists. Every Lo-Hed, from ½ ton up, has these extras... and they're yours at no extra cost.

Take the bottom block of a Lo-Hed Hoist, for example. It's completely shrouded to prevent the possibility of accidents. For further safety, a transformer on all A.C. installations puts 110 volts instead of line voltage at the push button controls. To cut lost time, the Lo-Hed's hook is suspended on an oil-impregnated bearing that prevents tangled lines.

In every feature of design and construction, Lo-Hed Hoists are your assurance of longer working life and lowest materials handling costs. Lo-Heds are made in five suspension types and in a capacity range from 500 to 24,000 lbs. Their "balanced" design gives you low headroom, too, at no premium.

Mail coupon for full information leading to new efficiency and economy.

LO-HED MEANS LOW OVERHEAD

LO-HED CAR PULLER . . . rugged . . . electrically-driven . . . moves railroad cars on private sidings cheaply and safely. . . . cuts demurrage costs . . . Saves money *inside* a plant, too; pulls anything within its capacity that can roll or slide . . . up grades, around corners.

AMERICAN ENGINEERING

COMPANY

PHILADELPHIA 25, PENNA.

AE Products are: Taylor and Perfect Spread Stokers, Marine Deck Auxiliaries, Nelo-Shaw and Hydramite Fluid Power, Lo-Hed Hoists, Lo-Hed Car Pullers.

American Engineering Company
2503 Aramingo Avenue, Philadelphia 25, Pa.

Gentlemen: I am certainly interested in efficiency. Send me full information about ☐ Lo-Hed Hoists . . . ☐ Lo-Hed Car Pullers.

Name_____ Title_____

Company_____

Address_____

City_____ Zone____ State_____

LARGE *Meat Packing Company*

SOLVES DIFFICULT CLEAN-UP PROBLEM

● You can't clean equipment with hose that makes marks! A large midwestern meat packer satisfied himself on this score by attempting to use ordinary makes of washdown hose for cleaning stainless steel processing equipment.

The hose just didn't work! Everything it brushed against got branded with dirty black smudges. Hose covers wore off prematurely on hard cement floors. Action of scalding water caused hose tubes to swell and break loose from the carcass. This tremendously reduced hose efficiency and caused dangerous blowouts.

The problem was turned over to Republic's local distributor, who recommended use of Republic Creamery Hose . . . a lightweight, flexible carrier, built with grease and abrasion-resisting white covers that never leave stains.

Since then there's been no sign of trouble, and after a long period of continuous service the Republic Hose remains in top working condition.

Republic Creamery Hose is just one of the complete line of Republic's Industrial Rubber Products designed to give you better performance at reduced costs. Write us direct or contact your local Republic Distributor for a free analysis of your job requirements.

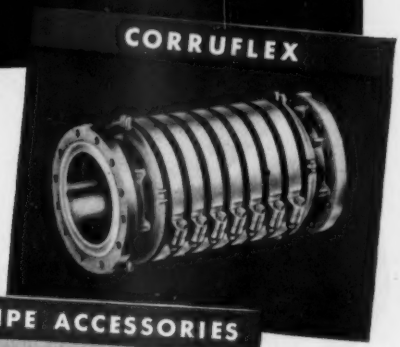
INDUSTRIAL RUBBER PRODUCTS BY

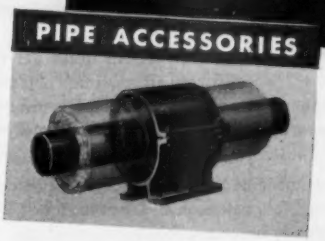
REPUBLIC RUBBER DIVISION

Lee Rubber & Tire Corporation

YOUNGSTOWN, OHIO

ADSCO EXPANSION JOINTS





ADSCO'S piston-ring expansion joints can be serviced *and* packed under full-line pressure. That's why they're best. Simple and compact, they will absorb expansion caused by temperature differential in pipes carrying liquids, gases, or steam. The high-polish surfaces of these joints can never be scored, because the slips are in contact only with packing. Misalignment is prevented by both internal and external guiding. Write for Bulletin 35-15G. Remember, only ADSCO makes all types of expansion joints. We don't have to sell what you don't want to buy.

ADSCO
75 YEARS OF LEADERSHIP

AMERICAN DISTRICT STEAM COMPANY, INC.
NORTH TONAWANDA, NEW YORK

You'll Avoid "Jam Sessions"

with

DARTS

...the Union that gives a Drop-Tight Closure!

This True Ball Joint Makes the Difference

DART UNIONS don't get tight, stay tight because of an ordinary "jammed" joint. Their tightness comes from a precision-ground, bronze-to-bronze ball joint that comes apart readily and remakes repeatedly — as tight as when new.

Both seats are non-corrosive bronze for top protection against pitting and corrosion. Nuts and both ends are high test, air refined malleable iron — practically indestructible in use or abuse.

Remember, the *extra* work life of a Dart is money in your pocket! Darts can be installed and reinstalled, time after time, with absolute assurance of tightness.

DART UNION COMPANY
Providence 5, Rhode Island
The Fairbanks Co. — Distributors
Boston New York Pittsburgh

DART
UNIONS

NEW PRODUCTS

(Begins on page 122)

¼ in. thicknesses as well as ¼ in. wired form for skylights and fire-retardant glazings. For maximum eye comfort, it may be ordered with frosted finish.

Tests are reported to show that the Aklo glass filters out more than three times as much sun heat as non-glare-reducing glass of the same thickness. For maximum heat exclusion the ¼ in. Aklo is specified; for maximum comfort with least heat and glare, the ¼ in. frosted Aklo, and for heat exclusion with a maximum of light transmission, the ⅛ in. Aklo. *Libbey-Owens-Ford Glass Co., Toledo, O.*

RUGGED PLATFORM TRUCK for extra heavy-duty handling jobs

This low-lift-platform Worksaver is a powered hand truck for the horizontal transportation of skids and skid bins.

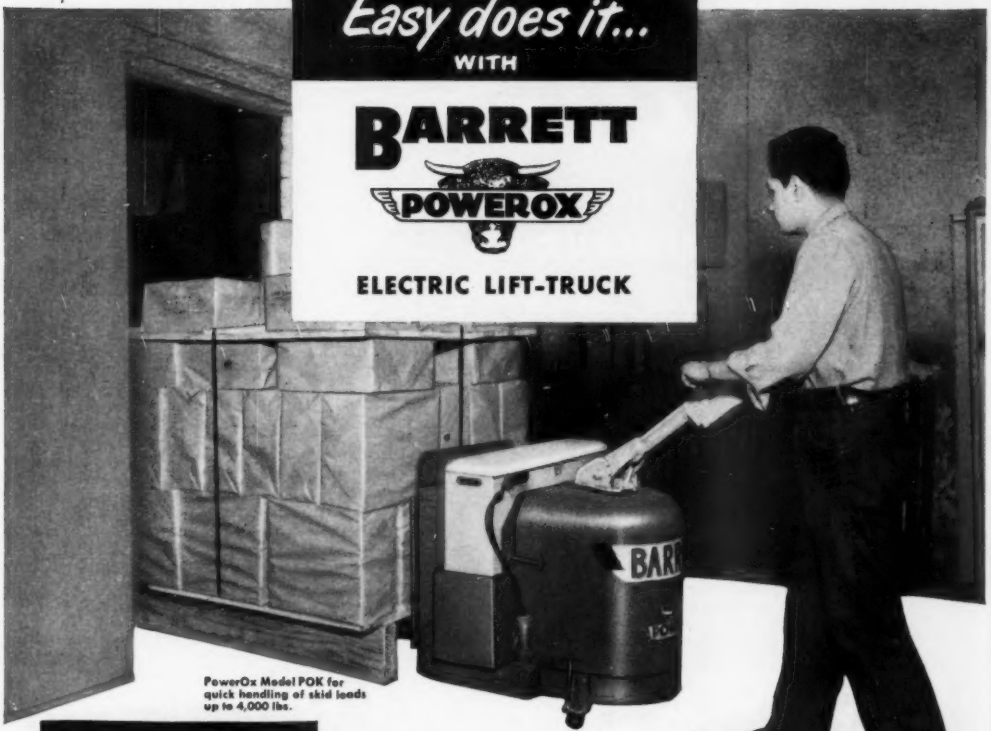
A 7500-lb model, it has the highest capacity of any truck in company's Worksaver line, yet keeps within dimensions of lower-capacity trucks. It has an 11-in.-high platform with 3 in. of lift. For operation on ramps, it has 5 in. of under-clearance. The platform is 26½ in. wide. Standard platform length is 42 in., but other lengths are available. *The Yale & Towne Mfg. Co., Philadelphia 15, Pa.*

AIR CONDITIONER is economical, self-contained 10 hp unit

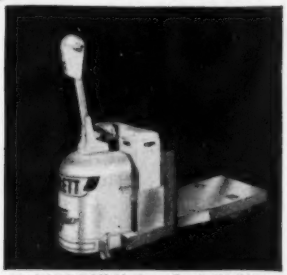
The MU-101 Unitaire Air Conditioner is described as ideal for manufacturing areas, offices, other applications calling for dependable, economical air conditioning. Two 12-in. double-inlet fans nominally deliver 4000 cfm. The fan section, which can be mounted either on top of the cooling section or at the side, can be rotated to give six different discharge arrangements when it is top mounted. When mounted at the side, five additional arrangements become available.

The trim, gray finished cabinet is thermal- and sound-insulated with glass fiber and aluminum foil. It is 91 in. high when top mounted; 61 by 32 in. at the base. In its side-mounted arrangement it is 62 in. high. Unit

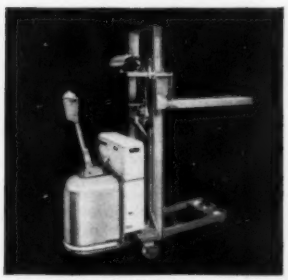
Easy does it... WITH BARRETT POWEROX ELECTRIC LIFT-TRUCK



PowerOx Model POK for quick handling of skid loads up to 4,000 lbs.



Model PO-POK Platform Truck. Walkie type for handling skids. Short turning radius. 4,000 and 6,000 lb. capacity.



Model PO-40 Hi-Lift Platform Truck. Speeds moving, lifting and stacking of skid platforms and boxes. 4,000 lb. capacity.

Pays for itself out of savings!

Lift and move your heaviest loads with the ease of electric push-button control. Handle any type skids . . . through production . . . around loading zones . . . in and out of storage . . . anywhere in your plant. 270 degree steering for congested area operation. The Barrett PowerOx quickly pays for itself with greater handling speed, low operating cost and easy maintenance features.

4,000 and 6,000 lb. capacities—narrow and wide models—lift, 4″ with 6″, 7″, 9″ and 11″ lowered heights. Variable platform lengths to suit your needs. Models also for handling single and double-faced pallets.

BARRETT-CRAVENS CO.
4649 S. Western Blvd., Chicago 9, Ill.
Representatives in All Principal Cities
Canadian Licensee: S. A. Armstrong, Ltd., Toronto, Canada

GET THIS HELPFUL, ILLUSTRATED CATALOG on the complete Barrett line of materials handling equipment. We'll mail it promptly upon request.

Barrett Handling Equipment

BARRETT

ONE MAN DOES MORE THAN 3 OR 4 . WITH A BARRETT

Pumps

FOR

MANUFACTURING

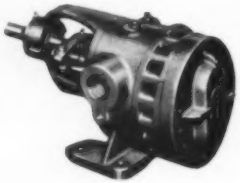
PETROLEUM, MARINE AND PROCESS INDUSTRIES

MODELS FROM 3/4 TO 300 G.P.M. — CAPACITIES TO 1000 P.S.I.

SPEEDS UP TO 1800 R.P.M. FOR PUMPING CLEAN LIQUIDS

SERIES F

Four-port design offers 8 optional piping arrangements. Equal size helical gears run in axial hydraulic balance. Standard or bronze fitted; packed box or mechanical seal. Up to 300 P.S.I.—1 to 300 G.P.M. for clean liquids.

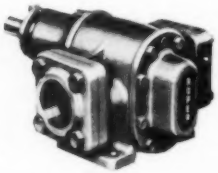


SERIES H

Widely used for hydraulic mechanisms and other applications where high pressures are required. Spur gears provide high volumetric efficiency. Packed box or mechanical seal. Pressures to 1000 P.S.I. — 5 to 75 G.P.M. sizes.

SERIES K

For hydraulic service, fuel transfer or fuel supply. Features helical gears and exclusive Venturi suction and discharge principle in 10 through 50 G.P.M. sizes. Packed box or mechanical seal. 150 P.S.I. — 3/4 to 50 G.P.M.



SERIES 3600

For general purpose work handling thin or thick liquids with suction lift up to 15 feet. Standard or bronze fitted; with or without built-in relief valve. Pressures to 60 P.S.I. — 40 to 300 G.P.M.

SEE OUR CATALOG IN SWEET'S

ROPER Rotary Pumps

GEO. D. ROPER CORPORATION
145 Blackhawk Park Ave.
Rockford, Illinois

NEW PRODUCTS

(Begins on page 122)

control is provided by a control board with selector switch and thermostat adjusting knobs. *Air Conditioning Div., Westinghouse Electric Corp., 200 Readville St., Hyde Park, Boston 36, Mass.*

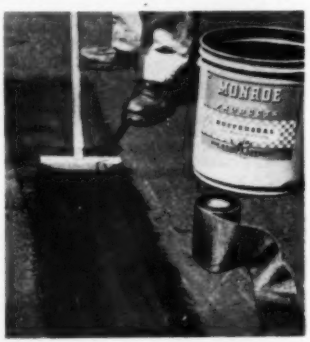
BIN LEVEL INDICATOR for suspended installation from above

Offered as a solution to the problem of dependable level indication in large bins is the Model CS Bin-Dicator. It is designed for suspended installation from above and can therefore be located anywhere in the bin where there will be a free flow of material to and away from the diaphragm. This flexibility of location is intended to permit its successful use in bins containing materials which tend to build up on the walls of the bin and flow down through the central area only. Under such conditions, the new model, mounted in the area of moving material, indicates high and low levels.

The Model CS is designed to be drilled and tapped to take any size pipe up to 2 in. The support also accommodates electrical wiring. Installation can be moved up or down in the bin to operate at different levels, or lifted out for inspection. *The Bin-Dicator Co., 13946—102 Kercheval, Detroit 15, Mich.*

REINFORCING FABRIC for use with roof coating in repair work

No-Rot is a reinforcing fabric for use in repairing roofs, stopping roof leaks and waterproofing areas around flashings, firewalls, chimneys and skylights.



This new membrane is composed of fireproof Fiberglas threads. It is reported to last the life of the roof and provide a perfect base for roof coating because of its sieve-like mesh which enables the coating to bind firmly to the surface below as well as to the membrane itself. As its name indicates, it is impervious to decay and rot, company points out, and it is light in weight and has great tensile strength.

Barkow, Milwaukee Crating and Boxing Specialist, Uses DELTA TOOLS in Packing Other Companies' Products

Everything from tiny repair parts to huge 40,000-lb. bottle-washing units comes to this thriving shop—overseas shipments or defense material to be crated to strict government specifications. Over 300,000 board-feet of lumber is used every month—all cut by Delta saws.

As a result of mass production efficiency and economies achieved in its own packing operations by means of Delta Tools, Barkow Manufacturing mushroomed its shipping department into a thriving specialty business, preparing shipments for neighboring companies—better, faster and cheaper than they can do it.

Barkow's Delta tools include four heavy-duty radial saws, two 10-inch circular saws, one 12-inch tilting arbor saw, a 14-inch band saw and a 17-inch floor-model drill press. All crating lumber is cross-cut to exact size on the radial saws, then fed to the table saws for accurate ripping. The band saw is used for special pieces to brace and support crates for delicate instruments and precision equipment.

Monthly consumption of lumber—over 300,000 board-feet—is enough for 20 five-room frame houses.

The "open secret" of Barkow's success is simply to carry through the sound basic principle of "the right tool for the right job" to its ultimate usefulness.

Why not find out how Delta tools can achieve mass production benefits in your packing and shipping operations? Ask your Delta dealer. He's listed in your classified telephone directory under "Tools".

There's a Delta Power Tool for Your Job - WOOD OR METAL WORKING

53 MACHINES • 246 MODELS • MORE THAN 1300 ACCESSORIES

Delta Tools
Another Rockwell Product

DELTA POWER TOOL DIVISION

Rockwell MANUFACTURING COMPANY

725E East Vienna Avenue • Milwaukee 1, Wisconsin

What is 100% Safe?

Anything less than 100% safe is 100% UNsafe.

This fellow's lucky, in a way. He *thought* his safety valves were 100% safe, and because they weren't, they might have killed him. Because those valves were *almost* safe, it's going to cost someone a lot of money.

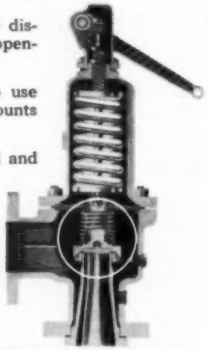
There's only one way to think of safety—think in terms of 100% or nothing. There's one sure way to *get* 100% safety—specify BalanSeal or FarriSeal Valves.

Why? Because they *can't* stick, plug or corrode. Critical working parts are permanently isolated from any contact whatever with the lading.

Because they're unaffected by back pressures in the discharge manifold due to its own operation or to the opening of other valves in the line.

Because these features make it possible for you to use smaller discharge piping, an economy which often amounts to substantially more than the cost of the valves.

You'll be interested in the engineering of BalanSeal and FarriSeal Valves—design which is rapidly gaining acceptance in hundreds of successful installations.



Ask for our "8-Minute Brief."

Your Safety's REAL With FarriSeal

Farris ENGINEERING CORP.

416 COMMERCIAL AVE., PALISADE PARK, N. J.

NEW PRODUCTS

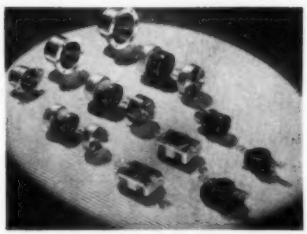
(Begins on page 122)

Developed especially for use with company's Rufferseal roof coating and Ruffersealit plastic cement (both regular and wet surface grades), No-Rot is flexible and can be fitted around corrugated surfaces, pipes and into corners to form a waterproof seal. *The Monroe Co., Inc., 10703 Quebec Ave., Cleveland 6, O.*

CURRENT CARRYING DEVICE locks to prevent accidental disconnect

The Hart-Lock is the newest of this manufacturer's wiring devices and is designed to lock in position. It is installed the same as other connecting devices, company says, but assures a positive lock by a simple twist of the cap in the connector body or receptacle. To disconnect, a reverse twist unlocks the device.

For long line assemblies, for overhead connections, for direct connection to machines and wherever cords may be subject to pulling, the Hart Lock is suggested to provide assurance of a constant supply of electrical current.



The new line includes an assortment of 20 amp, two-, three- and four-wire connector bodies; motor plugs, flush receptacles and caps. *The Arrow-Hart & Hegeman Electric Co., 103 Hawthorne, Hartford 6, Conn.*

LIGHTING FIXTURE is designed for safety, easy maintenance

Greater safety, easier maintenance, and faster servicing are among advantages announced for the AA-51 Series Explosion-Proof Lighting Fixture, available in sizes from 60 to 500 w. It is listed by Underwriter's Laboratories, Inc., for Class 1, Groups C and D hazardous locations.

Design features include full circle venting (use of entire lower edge of the hood as a continuous louvre), and porous metal interiors for more even heat distribution and cooler operation.

Company points out that the wire-free canopy construction in the AA-51 permits quick removal of the entire fixture. By exchanging clean, freshly lamped fixture units for those taken down, maintenance men can perform

RIGHT IN YOUR OWN BACK YARD... BY WEST

MOPWELL, BEST CLEAN-UP ON THE TEAM, SHOWS THE VISITING FIREMEN A FEW TIMESAVING TRICKS··· THANKS TO LUSTRECLEAN
BURSTLY BOILER COMPANY CAFETERIA
AND YOU'LL NOTE, I DON'T EVEN USE A SCRUBBING BRUSH···
AND TO THINK I'VE BEEN WEARING MY MOPS DOWN TO THE HANDLE··· WHEN I COULD HAVE BEEN USING LUSTRECLEAN THAT REQUIRES NO RINSING. AND LISTEN TO THIS··· IT'S GOOD FOR WOODWORK TOO···
LET'S BLACKBALL MOPWELL OUT OF THE BOWLING LEAGUE FOR NOT TELLING US ABOUT LUSTRECLEAN··· THAT IS, UNLESS HE BUYS THE BEERS NOW THAT HE'S ALMOST THROUGH···
NOW YOU SEE GENTLEMEN, LUSTRECLEAN WASHES AND WAXES IN ONE SIMPLE OPERATION··· SAVING ME HOURS EACH WEEK FOR BOWLING, TELEVISION, LOAFING AND OTHER PLEASANT ACTIVITIES···
IT LEAVES A SURFACE CLEAN AS A FROZEN MILLPOND!

THE MORAL TO OUR STORY? Make the job easier for your maintenance personnel . . . and you *automatically* lower your maintenance costs. Let 'em wax as they clean—with a specially formulated material that performs 3 operations in one!

LUSTRECLEAN (pine-scented or plain) cleans . . . deodorizes . . . and deposits a light film of wax. Effective on any type of surface! No heavy scrubbing. No rinsing. Mop dry . . . buff the film lightly if a soft satiny finish is desired! Save time and labor cleaning floors, walls, woodwork—wherever excessive wear and heavy traffic has made daily maintenance a back-breaking job.

LUSTRECLEAN really cleans! Its emulsifying action loosens the most persistent dirt, grime . . . hard-to-remove rubber burns. No need to use harsh soaps or injurious chemicals. Proof? Ask for a sample and test it on the spots and blemishes your present cleaner won't remove!

Pine Lustreclean is only one of many WEST products formulated for the promotion of sanitation. Others include floor sealers and waxes . . . washroom service . . . disinfectants . . . deodorants . . . insecticides . . . cleaners . . . soaps . . . protective creams. West is the exclusive distributor of Kotex Sanitary Napkins sold through vending machines.

WEST DISINFECTING Company

42-16 West Street
Long Island City 1, N. Y.
(64 BRANCHES IN U.S. AND CANADA)

SAVE $ $ $ . . . WAX as you WASH

I'd like to try a sample of Lustreclean

Pine-Scented ☐ Plain ☐

Name_____ Title_____

Company_____

Address_____

City_____ Zone_____ State_____

Dept. 52

Stanley Hammers do a Bang-up Job!

100 PLUS

Because...
they're perfectly balanced! Light-swinging, heavy-hitting Stanley Hammers are easy to use, make short work of any job in the shop. For extra driving and pulling power, experts choose the Stanley "100 Plus"... Aristocrat of all Nail Hammers. Curved claw and ripping patterns. Available in 20, 16 and 13 oz. sizes.

No. 51½

Because...
they're expertly designed for longer service. Drop-forged, "super heat-treated" steel heads securely fastened to "Evertite" hickory handles will never loosen. For all-purpose use, specify the No. 51½—16 oz. Nail Hammer. Highly polished head. Curved claw. Available in 5, 7, 10, 13, and 20 oz. sizes.

No. 312

Because...
Stanley Hammers are made in more than 40 versatile types, in a complete range of sizes, for every striking need. The No. 312—24 oz. Ball Pein, for machinists and special jobs, is available in a full range of sizes.

Standardize with Stanley
Order through your distributor
STANLEY TOOLS
NEW BRITAIN, CONNECTICUT

TOOL BOX OF THE WORLD

STANLEY

Reg. U.S. Pat. Off.

HARDWARE • TOOLS • ELECTRIC TOOLS • STEEL STRAPPING • STEEL

NEW PRODUCTS

(Begins on page 122)

actual relamping and cleaning at the work bench. To safety confine arcs, should current be on when fixture is removed, five threads on canopy are engaged when contact is made or broken. Canopies of the new fixture take any fixture in company's AA-51 line without re-wiring. *Appleton Electric Co., 1701-59 Wellington Ave., Chicago 13, Ill.*

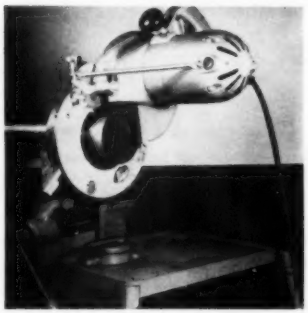
BONDER adheres to many kinds of surfaces, does a lot of jobs

Seal-All is a new formulation said to toughen with age, and never become brittle. According to manufacturer, it bonds wood, metal, glass, rubber, fabric and plastic, quickly and permanently; and it is not affected by gasoline, naphtha, alcohol or water.

Applications for announced Seal-All include sealing leaks in containers, rigid and flexible lines, repairing cracked battery cases and distributor caps, insulating and waterproofing electric wiring and ignition systems, also impregnating castings to prevent leaks. Additional information will be furnished by manufacturer. *Allen Products Corp., 20450 Sherwood Ave., Detroit 34, Mich.*

POWER SAW for quick cutting of metal pipe and tubing

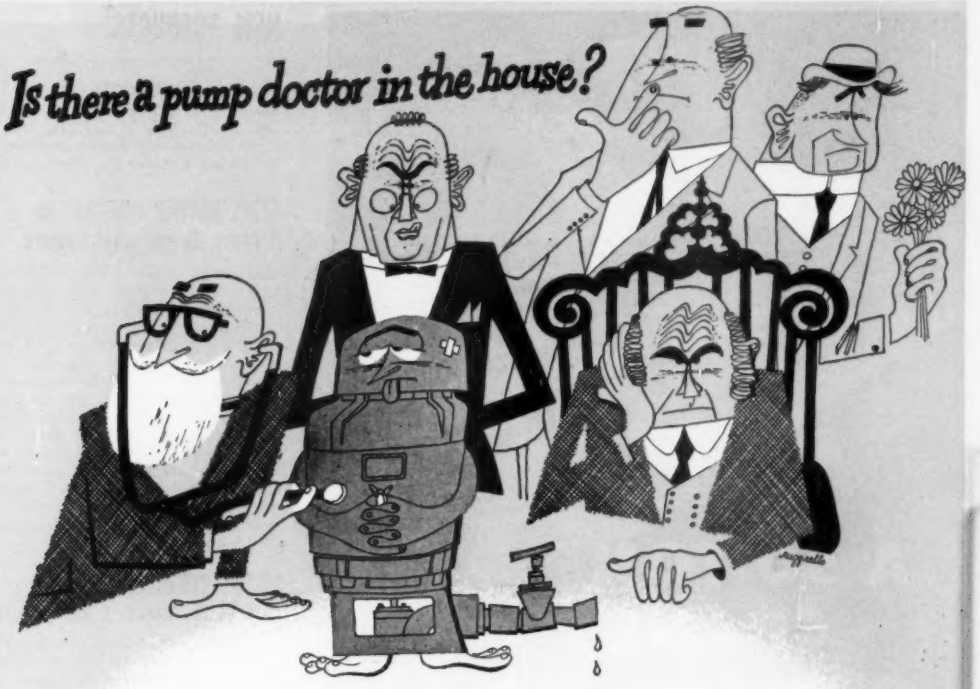
The Super Speed Saw is designed for use on aluminum, copper, stainless steel in varying wall thicknesses. This cut-off saw is light weight and uses standard 110-v a-c and is described as simple



to operate. A heavy-duty abrasive disk does the cutting, company says, slicing through the metal quickly and leaving smooth, square ends.

The saw has a free-moving, rotating frame which encompasses the piece to be cut. The cut-off saw is attached to the frame so that both frame and saw rotate together. The operator sets the saw to make the desired cut, and then rotates it 300 deg on the frame, cutting around the periphery of the tube or pipe until the cut is complete. The saw

Is there a pump doctor in the house?



YES... THERE'S A BJ PUMP SPECIALIST A FEW MILES OR MINUTES FROM YOU!

If you have a sick pump—or if you're having trouble diagnosing a pumping problem, a BJ pump specialist can help. These fully-qualified BJ Sales Engineers, working out of 31 *company* sales offices, bring you the benefit of BJ's 80 years' experience in meeting and solving every kind of pumping problem. These local Byron Jackson offices are in addition to BJ's six modern factories, six service shops, and reliable dealers. For pump engineering assistance and quick answers to your particular pumping problems, just phone your nearby BJ Branch Sales Office!

Byron Jackson pump manufacturing plants are located in Los Angeles and Fresno, Calif.; Houston and Plainview, Tex.; Lawrenceburg, Ind.; and Bethlehem, Penn.

In addition, BJ Service Shops are operated in Chicago Heights, Ill.; Chico and Lodi, Calif.; Casa Grande and Phoenix, Ariz., and Lubbock, Tex.

Byron Jackson Co.

Since 1872

P.O. Box 2017, Terminal Annex, Los Angeles 54, Calif.

Offices in Principal Cities

Lower your lights for lower maintenance costs

Using two men and a crane to maintenance overhead lights is like sending *two men and a tractor to carry a wrench.* For efficient servicing of high-bay lights, **there is no faster, safer means than THOMPSON disconnecting and lowering hangers!**

Lighting maintenance costs come down with the lights, and new safety records are set by service crews when **THOMPSON** hangers are installed. Simple manual control is exercised from floor level.

Don't service your overhead lights by costly or hazardous means . . . **install THOMPSON hangers and save money!**

Write today for CATALOG No. 50 for complete details.

472 TE

1. DISCONNECT 2. LOWER 3. SERVICE 4. REPOSITION 5. REPEAT

THE THOMPSON ELECTRIC CO.

1165 Power Avenue • Cleveland 14, Ohio

NEW PRODUCTS

(Begins on page 122)

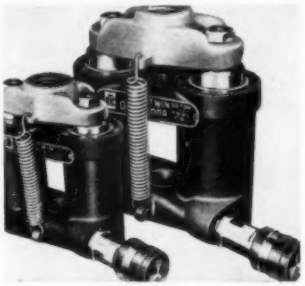
can be secured to bench or bench vise and is adjustable to any size tube or pipe. Bulletin 1252 describes it further. *Tri-Clover Machine Co., Kenosha, Wis.*

STEEL DRAWER UNIT has 18 drawers, larger label holders

This cabinet is 18 in. deep, and features wider, deeper drawers and easily read label holders. Drawer size is 5½ by 3½ in. by 17 in. deep, ample for holding filing cards as well as nuts, bolts, screws and electrical supplies. The drawers are equipped with two dividers adjustable on 1-in. centers and label holders are furnished on every drawer and divided. The over-all size of the cabinet is 18 in. deep, 14 in. high, and 34 in. wide; it's finished in olive green enamel. These sturdy steel cabinets can be stacked on each other to save space. *Equipto Div., Aurora Equipment Co., Aurora, Ill.*

30-TON HYDRAULIC RAM weighs only 23 lb, works in any position

The 30-Ton Power-Twin Ram is similar to company's popular 17½-ton model, but has almost twice the power. It features the same "center-hole" con-



struction and does pulling and installing jobs formerly considered impossible, manufacturer says; it is adjustable, designed to eliminate torque. The new ram is 6¾ in. high, 7½ in. wide, 3 in. thick and has a 2½ in. ram travel.

Both 17½- and 30-ton rams work off the same size pump which operates by remote control. Complete sets of attachments are available for plant maintenance, use on industrial tractors. *Owatonna Tool Co., 446 Cedar St., Owatonna, Minn.*

GENERAL PURPOSE TEMPLATE has 26 triangles and seven diamonds

The No. 51 Triangle and Diamond Template has triangles from 3/32 in. to 1 in., with increments in 32nds to ¾ in. and increments of ⅛ in. from 13/16 in. to 1 in. The diamonds range in

new 1200 amp. AMPROBE

Take the new Amprobe "1200" into your hand. Compare it with any other high-current volt-ammeter. You'll quickly recognize the advanced engineering and design that have gone into the "1200".

ELIMINATES ERRORS: Exclusive doughnut-type transformer eliminates for all practical purposes the factor of error due to position of conductor. COVERS NINE RANGES: 0-15/60/150/300/600/1200 (yes, 1200) amps AC, 0-150/300/600 volts. SAFER: Probe jaws insulated right down to the sockets. Voltage test lead plug automatically insulates itself when removed from meter. MORE CONVENIENT: So compact, carry it in your pocket!

Only $67.50, with leather case and leads. Also Amprobe "600", up to 600 amps, $59.50. Pyramid Instrument Corp., Lynbrook, New York.
(Export Division: 458 Broadway, New York City. Cable: Morhanex).

AMPROBE®

the only pocket-size snap-around volt-ammeter

WRITE TODAY: Dept. PE52

Pyramid Instrument Corp.
Lynbrook, New York

☐ *Send Bulletin No. 128, describing new Amprobe Models "1200" and "600".*

☐ *Send 16-page manual of time-saving uses: "Servicing with the Amprobe".*

Name _____

Company _____

Address _____

City _____ Zone _____ State _____

NEW

FIBERGLAS PLANT INSTALLS HORTON TANK for FIRE PROTECTION

An outstanding characteristic of fibrous glass is its non-combustibility. Even a blow torch won't make it burn!

But what about the plants that produce fibrous glass . . . are they as equally fireproof as their products? Can fire destroy their buildings, equipment and records? The answer is an unqualified YES . . . *unless adequate fire protection equipment is provided.*

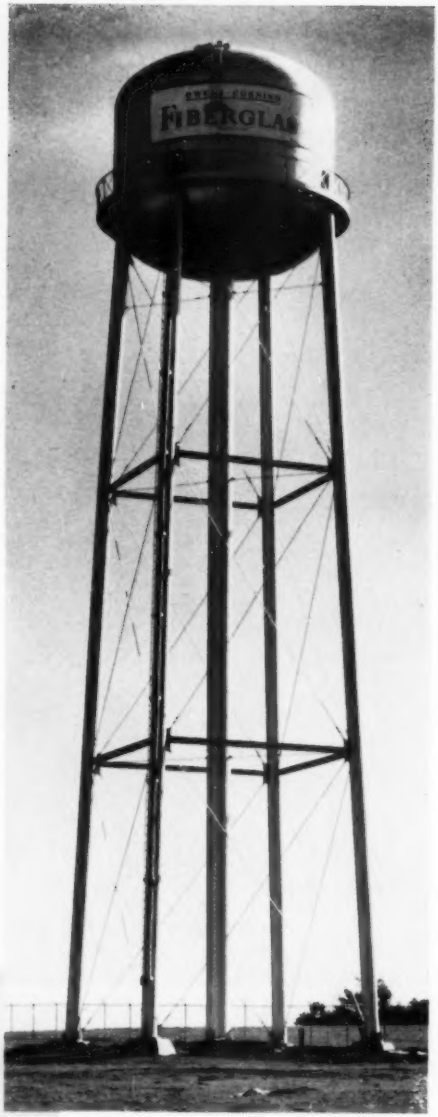
That's why the Owens-Corning Fiberglas Corporation—the world's largest producer of fibrous glass—installed an automatic sprinkler system and a Horton elevated water tank at its new Anderson, South Carolina, plant. This dependable combination will quench a fire the instant it starts. Action is completely automatic . . . *24 hours a day!*

Horton elevated tanks provide a dependable supply of water for fire protection because they operate by gravity pressure. There is no substitute for nature!

Horton elevated water tanks with ellipsoidal-bottoms are built in standard capacities from 15,000 to 500,000 gallons. Tanks with radial-cone bottoms are built in standard capacities from 500,000 to 3,000,000 gallons.

When requesting estimates, please state capacity of tank, height to bottom, location and type of insurance carried.

From each glass marble this size, the Fiberglas plant at Anderson, South Carolina draws a filament *95 miles long.* These filaments go into the Fiberglas yarn used for plastic reinforcement, electrical insulation, curtains, baling twine, mechanical rubber products and scores of other consumer and industrial products. Fibrous glass is extremely flexible, yet it has the tensile strength of about 230,000 lbs. per sq. in.



100,000-gal. Horton elevated water tank, 100 feet to bottom, built for the Owens-Corning Fiberglas Corporation at Anderson, South Carolina, by Chicago Bridge & Iron Company.

CHICAGO BRIDGE & IRON COMPANY

Atlanta 3	2148 Healey Building	Detroit 26	1569 Lafayette Building	Philadelphia 3	1649—1700 Walnut Street Building
Birmingham 1	1555 North 50th Street	Havana	402 Edificio Abrey	San Francisco 4	1582—200 Bush Street
Boston 10	1067—201 Devonshire Street	Houston 2	2166 C & I Life Building	Seattle 1	1370 Henry Building
Chicago 4	2134 McCormick Building	Los Angeles 17	1574 General Petroleum Building	Tulsa 3	1669 Hunt Building
Cleveland 15	2258 Guildhall Building	New York 6	3317—165 Broadway Building	Washington 6, D. C.	1130 Cafritz Building

Plants in BIRMINGHAM, CHICAGO, SALT LAKE CITY, and GREENVILLE

In Canada: HORTON STEEL WORKS, LIMITED, FORT ERIE, ONT.

NEW PRODUCTS

(Begins on page 122)

size from ¼ in. to 1 in. in increments of ⅛ in. Diamonds up to 2 in. may be made by using triangles back to back. The template is made of 0.030 matte finish plastic and cut-outs have pencil allowance for accuracy. It is 4 by 7 in. in size, costs $1.50. *RapiDesign, Inc., P. O. Box 592, Glendale, Cal.*

PROPELLER FAN is direct-drive, vertical unit for exhaust use

The Model MDA Fan is installed flush with the ceiling, the totally enclosed motor and motor mountings being concealed by the ceiling—only the base

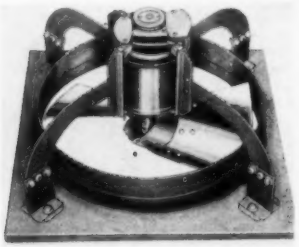


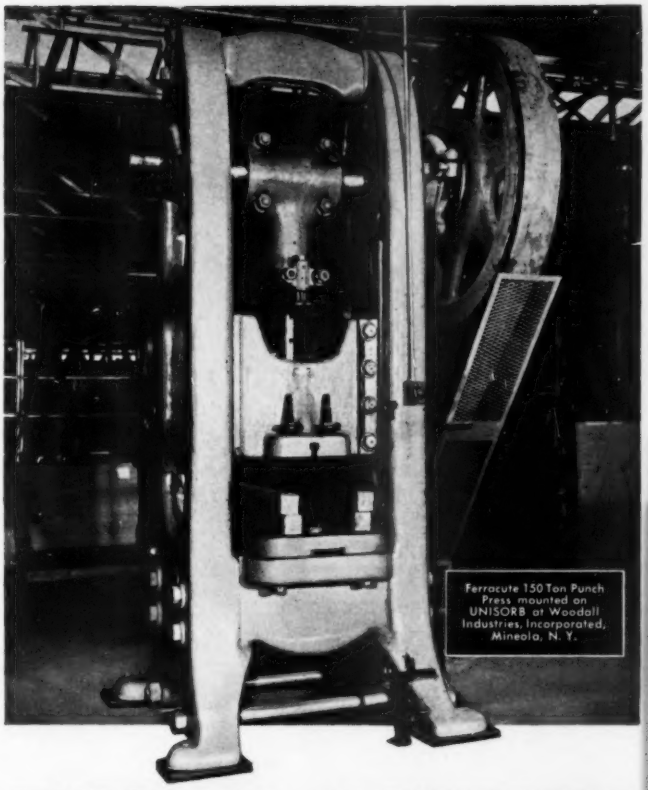
plate and fan blade are visible from the room. Blade sizes range from 14 to 36 in., and motors are available in various current characteristics, differing in horsepower in proportion to the size of the fan. Air delivery ranges from 1585 cfm to 12,400 cfm.

When corrosive fumes are handled, the MDA can be obtained with acid-resisting varnish capable of withstanding alkali and fumes in moderate concentrations, company adds. Other details about the fans given in Bulletin 3429. *Herman Nelson Div., American Air Filter Co., Inc., Moline, Ill.*

A-C OVERLOAD RELAYS for motor starters and controllers

The Type ZTM Thermal-Magnetic Overload Relays are suggested for use in squirrel-cage, synchronous and wound-rotor motor starters and controllers. Independent thermal and instantaneous tripping elements are operated from one magnetic source. The thermal element provides timed-response to the thermal energy of motor load currents by a U-shaped bi-metal connected to the secondary of the magnetic circuit. On high currents resulting from faulted circuits, the leakage flux across the poles of the magnet at the primary-coil end attracts the armature to open the instantaneous-contacts and quickly disconnect the starter.

Relay contacts are silver and operate with snap-action. As standard, the thermal element has automatic re-set



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Helps You Eliminate 60% to 85% of All Transmitted Machine Vibration and Noise

Almost every kind of machine can be anchored on every kind of flooring the modern way . . . with UNISORB.

No bolts . . . no lag screws . . . no more unsightly, destructive floor drilling, either. A special cement, which we supply, binds the UNISORB pads to machine feet and floor with a holding strength of 1500 lbs. per square foot *minimum.*

What's more, the dramatic reduction in vibration helps increase the life of your machinery . . . saves building and floors. And the noise reduction can very well mean for your company, as it has for so many others, a positive benefit toward worker morale.

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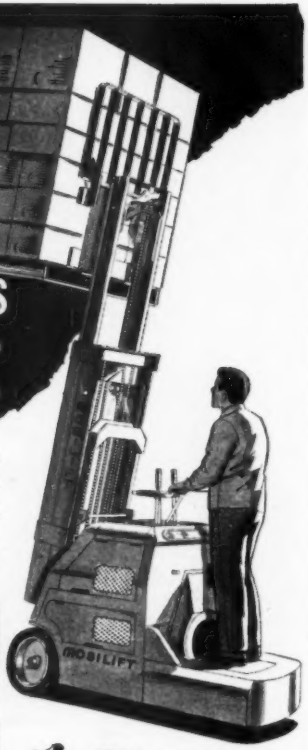

Across the nation industries agree that MOBILIFT'S 15 years experience in building and improving STAND-UP fork lift trucks assures an efficient, hard-working truck . . . speedy and maneuverable in tight places.

Operators prefer MOBILIFT'S unobstructed visibility . . . easy, less fatiguing handling . . . safety.

Whether you need a 2,000-lb. capacity fork truck with 63" mast for loading and unloading trucks, or a 3,500-pounder with 72" mast and 110" lift for your warehouse...a MOBILIFT *Stand-Up* model will do your job quicker, safer, and at less cost.

Unequalled maneuverability...short turning radius . . . unobstructed forward-backward visibility . . . grouped push-pull, positive action controls...safe "deadman" brake . . . these and other *exclusive* features make MOBILIFT *Stand-Up* models equally fast and efficient in crowded or roomy work areas.

Lev-R-Matic DRIVE

Lev-R-Matic, grouped 2-way PUSH-PULL levers give instant, finger-tip control... forward, back, elevating, and tilting. MOBILIFT multiple disc clutch insures smooth, positive action... THERE ARE NO GEARS TO SHIFT!

Mobil-Chain Lift...Controlled power, roller-chain-operated lift allows unobstructed view between uprights.

MOBILIFT'S 3-cylinder heavy duty engine is air-cooled, compact, well-balanced and operates smoothly for long trouble-free service.

STAND-UP MODELS IN 2,000, 2,500, 3,000 and 3,500-POUND CAPACITIES are available with 63", 72" and 83" MASTS.
(Special Mast Heights to Order.)

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2730 San Pablo Ave., BERKELEY

NEW PRODUCTS

(Begins on page 122)

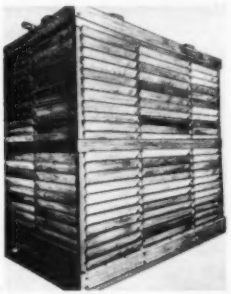
contacts with hand re-set contacts for the instantaneous element. Other combinations are optional. These relays are front-connected and may be removed as a unit from the mounting base. *The Electric Controller & Mfg. Co., 2700 E. 79th St., Cleveland 4, Ohio.*

LEVER JACK is light weight, but offers 10-ton capacity

The Simplex A1022 is a ratchet lowering lever jack with aluminum housing and weighs only 42 lb. It is designed to meet the demand for light weight versatility in a wide range of uses. The jack has a minimum height of 20½ in., a 12-in. lift and a broad toe lift with minimum height of 2 in. The toe lifts the full rated capacity of the jack. Other features of manufacturer's Simplex line—alloy steel operating parts and double-lever sockets—are incorporated in the A1022. *Templeton, Kenly & Co., 1020 S. Central, Chicago, Ill.*

COOLING TOWERS are low-cost packaged units, ready to install

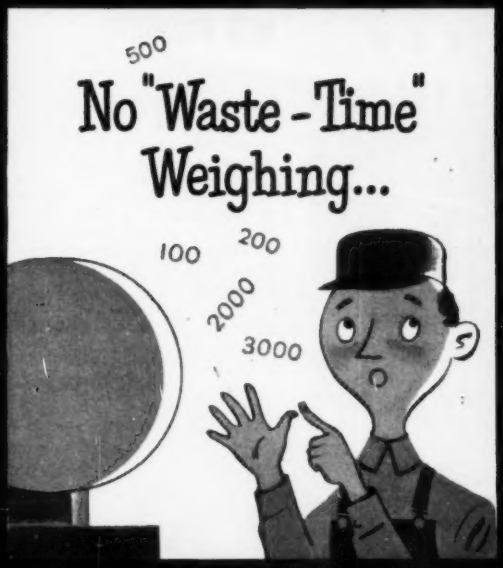
Cotospray Towers are built of clear all heart redwood, manufacturer states, and bolts, nuts, washers and nails are



galvanized steel. The distribution header is steel and nozzles are bronze, non-clogging type. Louvers are 1 in. surfaced redwood, and basins are leakproof steel pan type with redwood sideboards through-bolted to basin sills. Bulletin 5.9.083 describes these towers. *Equipment Div., J. F. Pritchard & Co., 908 Grand Ave., Kansas City 6, Mo.*

PNEUMATIC GRINDER is small, but intended for heavy-duty work

The No. PGK2122L is designed for extreme accuracy on large, tough grinding jobs. It is said to be particularly effective for rotary filing on aluminum and magnesium castings, or any fast, large scale grinding job. It weighs only 1¾ lb and is compact, with an extended spindle that allows greater pressure on the work.



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You speed your weighing operations with Fairbanks-Morse Bench Dial Scales. And that means there are no "bottlenecks" to hold up production all through your plant. Here's why:

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HOME WATER SERVICE EQUIPMENT • RAIL CARS • FARM MACHINERY • MAGNETOS

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Chesterton Belt-Flo is a new liquid belt dressing that contains neither rosin nor asphalt. It will not pick up dust or dirt. It will increase transmitted horsepower up to 50%! It never builds up on belts.

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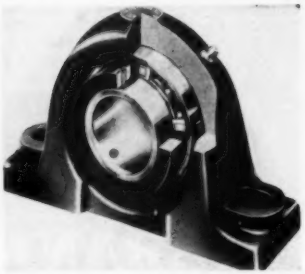
NEW PRODUCTS

(Begins on page 122)

A four-vane rotary motor that surges with power and is adjustable to various speeds is incorporated, and a speed regulator and quick-action lever throttle. Manufacturer says vibration is eliminated by perfect balance and the tool has a noise silencer. Eight sizes of Erickson collets are available. *Mall Tool Co., 7725 South Chicago Ave., Chicago 19, Ill.*

UNIT PILLOW BLOCK incorporates lubricant-retaining seal

A lubricant-retaining Du Pont Fairprene red seal and practically frictionless wiping action of the seal against the inner bearing ring are leading features



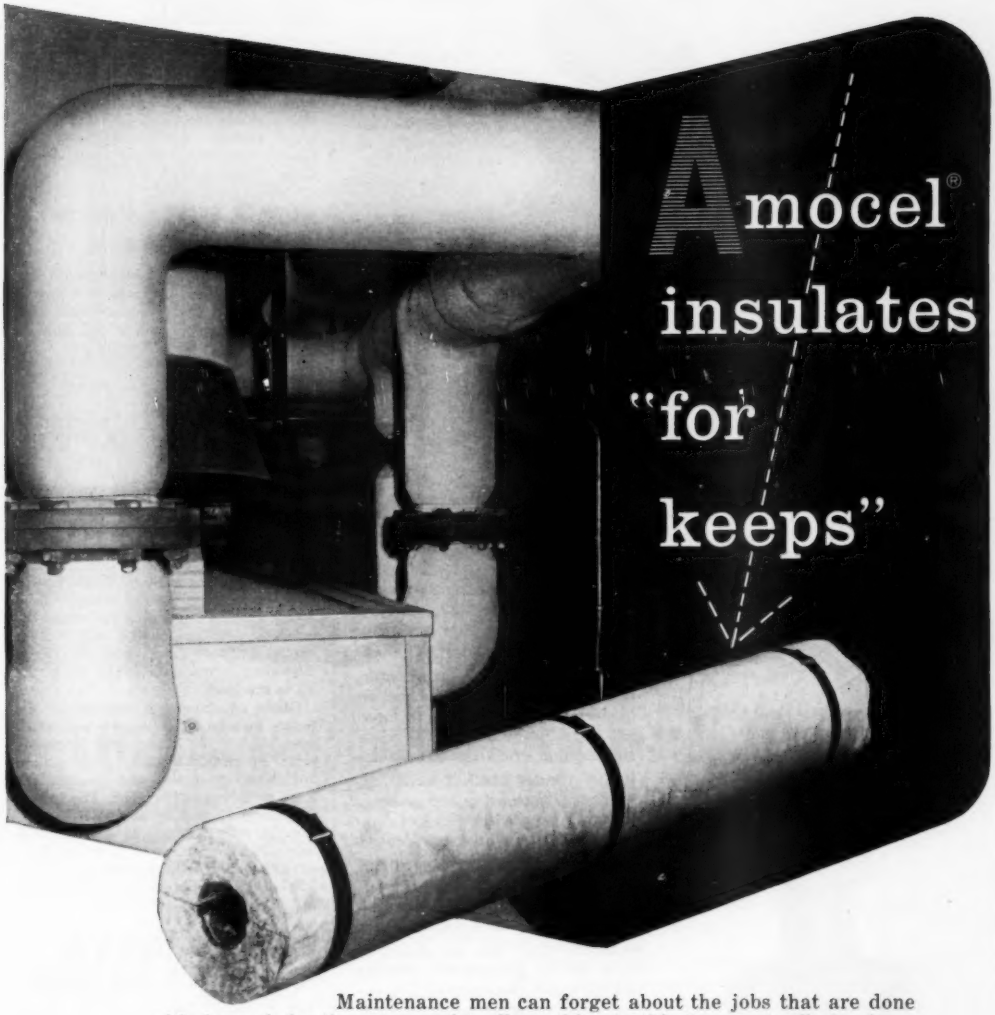
announced for the new Hess-Bright SY Pillow Block. Other features include rotating flingers to exclude dirt, a collar with set screws for easy installation, re-lubrication through Alemite fitting, and interchangeability with existing installations.

The SY was designed for use in conveying, ginning and textile machinery; light fans and blowers; light power take-off units and jack shafts. It is quickly applied and factory-sealed against dirt contamination. Shaft diameters range from 1-3/16 to 2-15/16 in. *SKF Industries, Inc., P.O. Box 6731, Philadelphia 32, Pa.*

CRANE CAB COOLER is split-type 3 hp continuous ventilating unit

To its line of crane cab air conditioning and ventilating equipment, this manufacturer has added the Model C-3SP, designed to maintain a temperature of 80 to 85 F within a cab when surrounding ambient temperatures reach 130 F. The unit, which supplies continuous ventilation, is equipped with electric strip heaters for winter heating, dust and dirt filters and activated carbon canisters for fume and odor removal.

Operation and control for summer and winter temperatures is automatic. The small evaporator section can be installed within the cab, while the condenser section may be located in any



Maintenance men can forget about the jobs that are done with Amocel, for time means virtually nothing to this "permanent" pipe insulation. It's Unarco's exclusive development for low-cost commercial use on steam and hot water lines and for all other work within 600°F., maximum. Amocel has many of the fine extra-service features formerly found only in Unarco's higher-temperature insulation, Unibestos. You'll like its easy application; its money-saving, long-lived efficiency.

UNARCO

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KENNEDY

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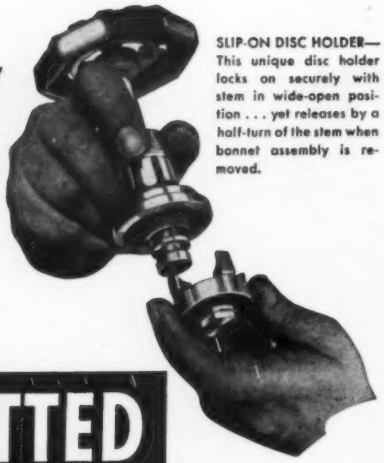
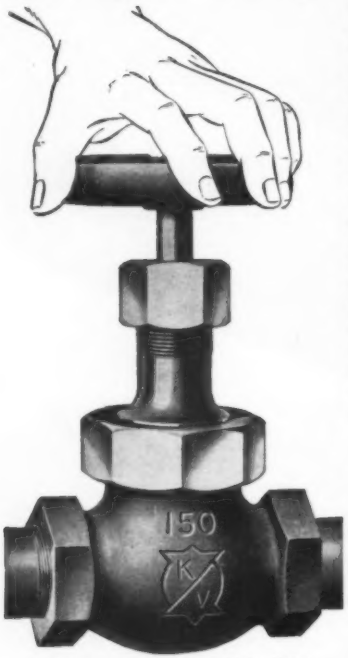
JOB-FITTED

for longer service, easier maintenance



SLIP-ON DISC HOLDER—This unique disc holder locks on securely with stem in wide-open position . . . yet releases by a half-turn of the stem when bonnet assembly is removed.



KENNEDY Fig. 89, Bronze Globe Valve 150 lbs. steam, 300 lbs. WOG, non-shock

YOU KEEP MAINTENANCE COSTS DOWN with KENNEDY Bronze Valves because they are *job-fitted*—every valve specially designed and engineered for the job it has to do.

THE KENNEDY FIG. 89, for example, is designed for services where frequent inspection, cleaning of internal parts and quick renewal of the composition disc are required.

HEAVY UNION BONNET RING permits easy dismantling and reassembly of the valve without risk of damage to body-bonnet bearing surfaces.

RENEWABLE COMPOSITION DISCS are available in a variety of materials to meet a wide range of fluid, pressure and temperature requirements.

RUGGED BODY has an unusually high seat to prolong disc life by utilizing full thickness of disc before disc-holder strikes the base of the raised seat.

LONG-WEARING PACKING—molded rings of lubricated asbestos—maintains easy operation and tight seal to prevent leaks. Valve can be repacked under pressure.

FOR BEST RESULTS and real economy, standardize on KENNEDY Bronze Valves . . . and the complete line of KENNEDY Iron Valves, Malleable, Cast-Iron and Bronze Pipe Fittings.

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THE KENNEDY VALVE MFG. CO. • ELMIRA, N.Y.

VALVES • PIPE FITTINGS • FIRE HYDRANTS

NEW PRODUCTS

(Begins on page 122)

convenient place on the crane. The two sections are connected by refrigerant piping. *Air Conditioning and Combustion Dept., Dravo Corp., Dravo Bldg., Pittsburgh 22, Pa.*

MAGNETIC BRAKE contains only six major operating parts

This new magnetic brake design features a direct, automatic set and release action between solenoid and armature, eliminating use of levers and linkage.

The solenoid is a one-piece "doughnut" design to permit the motor's output shaft to extend completely through the brake and let the user utilize both ends of the shaft for powering two pieces of equipment when desired. These brakes are also described as well suited to fluid coupled motors and gear reducers—the brake is installed on the output shaft of the fluid coupling with the shaft extending through the brake for hook-up to the load.

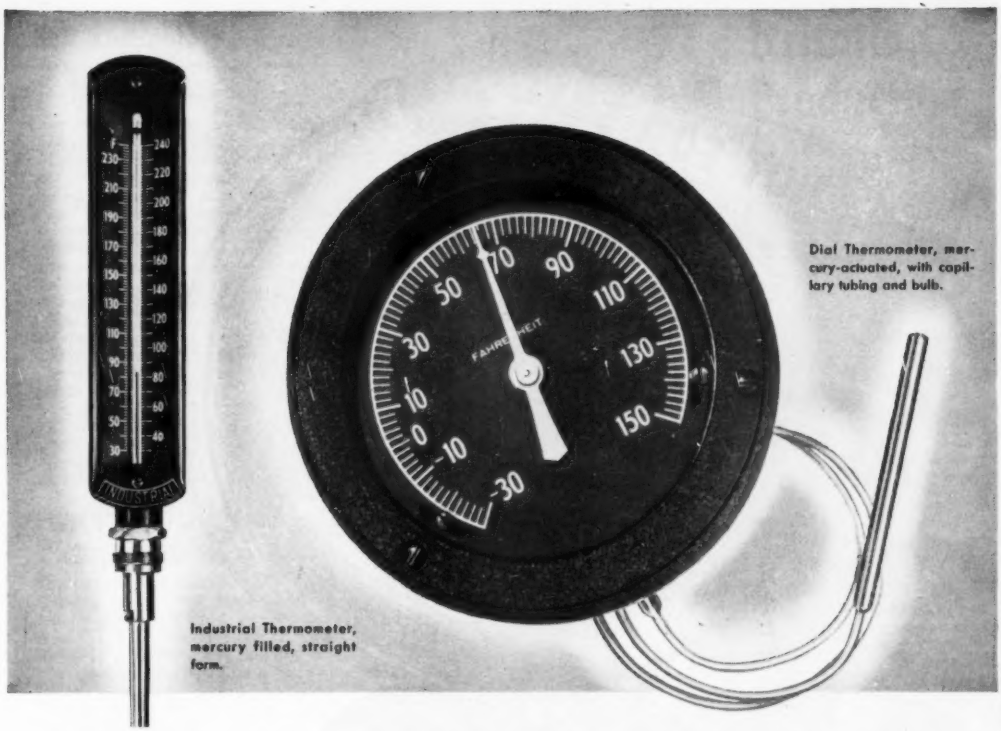
Other advantages announced for the brake include light weight and short over-all length; lining wear compensated by spring tension; quick action; automatic operation, and manual release and automatic re-set. The brakes are available in 3, 10 and 25 ft-lb continuous duty ratings, 15 and 35 ft-lb intermittent duty types. Data on them are provided in Engineering Folder MB-1000. *Reuland Electric Co., Alhambra, Calif.*

ELECTRIC FORK TRUCK is designed for use in close quarters

The J Model SpaceMaster is offered for use in plants cramped for space and having limited floor capacity. It's a lightweight unit said to make electric fork truck installations possible where they couldn't be considered before. Company says it is rugged despite its light weight, is built with heavy-duty components and has stamina to give long periods of full-power service, but has slightly less travel and lifting speed. *Department R-1, Lewis-Shepard Products Inc., Watertown, Mass.*

COPYING MACHINE is low priced, high speed whiteprinting unit

The Copyflex Model 30 is suggested for plant engineers with moderate print requirements and a low budget for equipment outlays. It will speed production of engineering drawings, trac-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Industrial Thermometer, mercury filled, straight form.
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Whenever an industrial temperature has to be taken there is a USG thermometer for the job. You have your choice of the Industrial Type in all sizes, and mounting forms with standard or protected stems; or the Dial Type in a variety of sizes, case styles, mountings, ranges, and connections. Gas, mercury or vapor-actuated.

For typical applications of commercial and approved Navy Standards, covering dimensional information and the use of bushings, flanges, sockets and special tubing, send for Catalogs 100 and 200.

Special thermometers for dough testing, milk testing, fuel gas, candy, solder baths, varnish, canning, vulcanizing and other unusual processes.

Industrial Thermometer of the 45° Recline Form. There are 5 other standard forms.

Dial Thermometer with bottom-connected rigid stem, one of many USG types available.

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Ever since you were knee-high to a hop-toad, you've heard about America's wonderful *natural resources*—the bountiful fertile fields, the towering timber growth, the boundless water power, and the untold wealth of gold, iron, oil, silver, coal and other natural treasures that lie buried in the ground.

Is it because America has *more* natural resources than any other country that Americans enjoy the world's highest standard of living? No—many countries have as much—some have more.

Then is it because Americans *do* more with what they've got?

Yes! And the reason is as plain as the nose on your face. It's because Americans are free to develop their natural resources—and their natural resourcefulness—in the wholesome climate of *open and strenuous COMPETITION.*

COMPETITION—not "regimentation"—is what eggs a man on to do his best.

COMPETITION—not government control—is what urges a business to give its customers ever greater value for their money.

So let's say "NO SALE" to the *ism* peddlers who would have us swap our U. S. A. system of free competition for their "planned" regimentation—trade our U. S. A. freedom and plenty for their serfdom and poverty!

* * *

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THE COMPETITIVE SYSTEM DELIVERS THE MOST TO THE GREATEST NUMBER

NEW PRODUCTS

(Begins on page 122)

ings and other large sized technical originals. This model has a 46-in. printing width to handle 42 in. roll stock or insertion of multiple cut sheets of copying paper. A 48-in. 2000-w Vycor mercury arc lamp is provided for uniform exposure and to speed printing to a maximum of 12 fpm. A print is ready for use upon delivery by the machine, which requires only a connection to a 230 v, 60 cycle a-c line.

The Model 30 is a self-contained unit, requiring no inks, special lighting, dark rooms or other equipment. Copies may be made on Copyflex sensitized paper, acetate-coated paper, film and cloth. Operation of the machine is simple—a control switch turns it on, another control regulates printing speed. *Charles Bruning Co., Inc., 125 North St., Teterboro, N. J.*

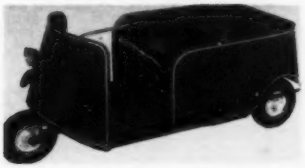
HIGH-LIFT PLATFORM TRUCK for stacking of skids and skid bins

This new telescopic platform Worksaver is a powered hand truck of 4000-lb capacity. It has a lowered platform height of only 6½ in. and will lift loads as high as 126½ in. For stability and traction, it has an articulated frame designed to permit continuous floor contact of load and drive wheels despite ramps and floor variations.

The hoist pushbutton is on the operator's control handle. A hand- or foot-operated lowering control on the front of the battery compartment is provided for adjustable-speed lowering, and twin hydraulic pumps and motors are used for fast lifting. The hydraulic system includes a relief valve to protect equipment from overloads. *The Yale & Towne Mfg. Co., Philadelphia 15, Pa.*

ELECTRIC PICK-UP for small parts handling, efficient transportation

This newly designed Autoette Pick-Up offers an extremely short turning radius and simple hand-controlled silent oper-



ation. It has three speeds forward or reverse, and has automotive type internal expanding brakes, welded steel frame, and full spring suspension and pneumatic tires. Carrying capacity of the pick-up is 500 lb, with a payload space of 28 by 35 by 11 in. Speed, with three batteries, is 12 mph. *The Blood Sales Co., 545 W. Anaheim St., Long Beach 13, Cal.*

STOP Irritating Production Delays

Latest Improved Dual-Element Fuse

JEFFERSON SAF-T-LAG FUSES

Simple strong copper alloy trigger spring

All copper parts. — no zinc. Lower watt loss — cooler fuse.

Sure Protection

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How To Select Fuses For Proper Motor Protection

• Jefferson provides a complete chart for proper fuse selection, 1.3 amps. to 600 amps., — for single and three phase motors, all standard voltages — for "Ordinary" service and "Heavy" service. Write for Folder 482-ST.

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PIONEER MANUFACTURERS OF FUSES OF ALL TYPES. RENEWABLE AND NON-RENEWABLE. SOLD THROUGH ELECTRICAL WHOLESALERS EVERYWHERE.

What's the capacity of this block?

If you don't know.. don't use it!

An overloaded block can be as expensive as it is dangerous. For example, just imagine dropping a cabin cruiser!

To help prevent such catastrophes, American CROSBY Wire Rope Blocks are *Load-Rated*. The safe working capacity of the block is embossed in the side plate. American CROSBY Blocks are built with the same rugged quality found in giant American crane blocks. Individually packaged, they are delivered in clean, perfect operating condition. Sold by distributors and supply houses everywhere, and made by the makers of genuine Crosby Clips, the famous wire rope fasteners . . . AMERICAN HOIST & DERRICK COMPANY, St. Paul 1, Minnesota.

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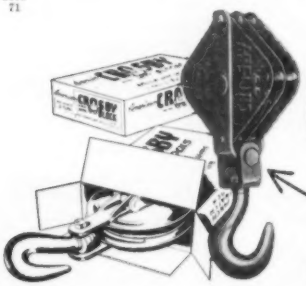

American CROSBY Load-Rated! WIRE ROPE BLOCKS

BULLETINS

(Continued from page 36)

charge units are covered, and outstanding construction features detailed. Suggestions on where to place heaters for most effective heat distribution are provided. Also included are basic steam and hot water capacity data, conversion factors. C. A. Dunham Co.

139 Electric Radiant Heaters—The ten big advantages of manufacturer's far-infrared heaters—uniform heat, durability, high intensity radiation, quick warm-up and others—are explained in 6-pp Form CS604. Several typical installations are shown. Specifications, prices and data on controls included. Edwin L. Wiegand Co.

140 How to Choose a Furnace—Booklet B-5459, 38 pp, tells how to match a furnace to a particular heat-treating problem. Titled, "Harnessing Heat," it describes 12 types of gas and electric furnaces, briefly outlining their chief field of application; also discusses tailor made furnaces to meet specific problems. A protective atmosphere section describes four basic types available —Endogas, Exogas, Monogas and Ammogas —and gives combinations and applications of these types as well as descriptions of accessories. Also provides data on materials handling methods for heat treating of metals. Westinghouse Electric Corp.

PUMPS

141 "A Turn for the Better"—Bulletin 30-B, 8 pp, discusses manufacturer's improved Moyno pump, explaining in detail its progressing cavity feature and showing how the rotary motion created provides continuous flow at positive pressure. Stresses performance advantages of the pump, explains construction. Lists some of the many fluids it pumps, and includes dimensional data. Generously illustrated. Pump Div., Robbins & Myers, Inc.

142 Centrifugal Sump Pumps—Eight-pp Bulletin WQ-220 announces improved models of company's Types VS and VN sump pumps. These are available in wet and dry pit types and adapted to handling clear liquids, sewage and other liquids containing solids, in capacities to 1000 gpm and pressures to 250 psi. Explains advantages of these vertical centrifugal pumps, describes and pictures construction features. Warren Steam Pump Co., Inc.

143 Chemical Process Pump—A pump for handling most all process liquids, hot or cold, in moderate capacities against low, medium or high heads, including corrosive and abrasive liquids with up to 5 per cent solids in suspension is described in 8-pp Bulletin B-1600. Explains and illustrates design and construction features, gives specifications of this pump, available in grease-lubricated and oil-lubricated types. Peerless Pump Div., Food Machinery and Chemical Corp.

144 Pump Selection Guide—Here's a new type of reference chart on small pump applications. In one convenient table it lists various types of company's pumps, services for which each is built, performance characteristics, types of packing, styles of mounting and features that distinguish each model. Tuthill Pump Co.

145 For Controlled Volume Pumping—Bulletin 300, 24 pp, describes manufacturer's line of Pulsafeeder piston-diaphragm pumps, stressing their no-stuffing box feature and noting that although basically a pump, this unit can do the work of a chemical feeder, a meter, an instrument,

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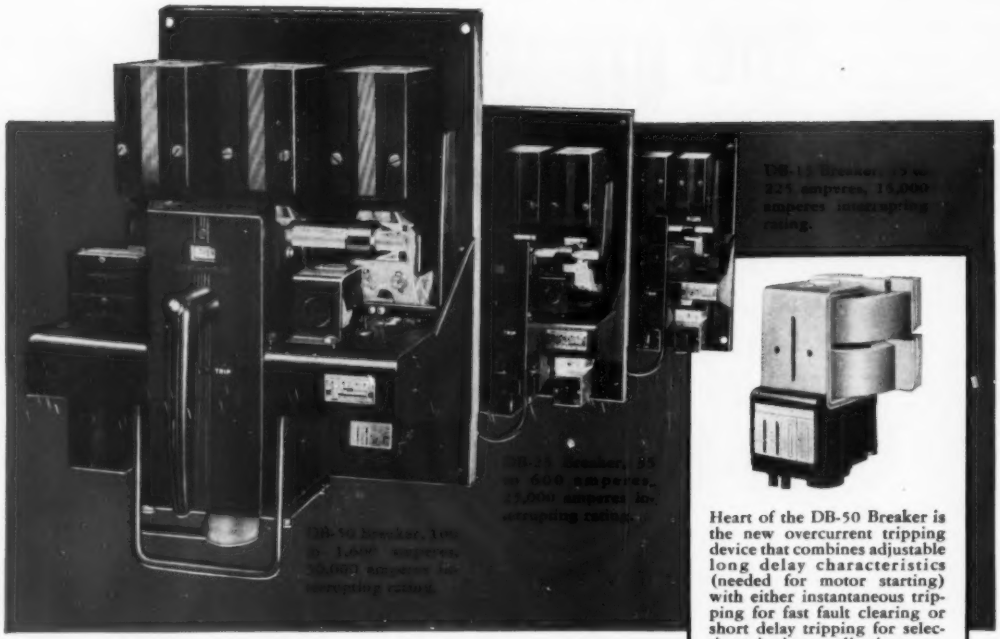


Heart of the DB-50 Breaker is the new overcurrent tripping device that combines adjustable long delay characteristics (needed for motor starting) with either instantaneous tripping for fast fault clearing or short delay tripping for selective tripping applications.

Now...15,000, 25,000, 50,000 amp.* Breakers *in a UNIFORM DESIGN!*

The new DB-50—most recent addition to the DB line of low-voltage breakers—extends the range of interrupting ratings to 50,000 amperes, continuous current ratings to 1,600 amperes. The co-ordinated design provides uniformity in construction features and operating characteristics, plus a completely flexible overcurrent tripping device.

The ability to close and latch on fault current is the latest and most severe requirement of a modern breaker. This requirement results from delayed tripping schemes designed to provide selective operation. Closely allied is the additional requirement of ability to carry, for periods up to 30 cycles, fault currents equal to the interrupting rating. Contacts, latching mechanism, and closing means of the uniformly-designed Westinghouse DB line of low-voltage air circuit breakers meet these rigid requirements.

The DB-50 has the same desirable unit construction as its smaller counterparts. It is this feature that allows you to add or remove any component as an assembled unit in the field.

Booklets B-4067 on the DB-15 and DB-25, and B-4740 on the DB-50 contain complete information. For copies, call your Westinghouse representative or write Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh 30, Penna.

See "Electrical Proving Ground" . . . the dramatic story of the Westinghouse High Power Laboratory in sound and color motion picture. For details, see your Westinghouse representative or write Westinghouse Film Division, Box 868, Pittsburgh 30, Pennsylvania. J-60748

YOU CAN BE SURE... IF IT'S Westinghouse

"DE-ION" CIRCUIT BREAKERS TYPE DB

DESIGN TESTED AND VERIFIED IN THE Westinghouse HIGH POWER LABORATORY

*Interrupting Rating

a filling machine, a proportioner and a sampler. Also discusses special liquid-handling assemblies. Manual and automatically-controlled types shown. Process Equipment Div., Lapp Insulator Co., Inc.

LUBRICANTS, LUBRICATION

146 Lubrication Case Histories — This new 8-pp edition of "Studies in Centralized Lubrication" presents six examples of how company's centralized lubricating systems for industrial machinery have provided worthwhile savings in time, manpower, lubricant and power used, as well as increased bearing life. The Farval Corp.

147 For Extreme Bearing Pressure—Bulletin 53 presents technical data on two molybdenum-disulfide lubricants, Molykote Z, a dry lubricant in powder form, and Molykote G, a grease consistency mixture. Explains how Molykote lubricants are able to lubricate at high bearing temperatures, resist galling, seizing. Discusses application of both types. Alpha Corp.

148 Moly-Sulfide at Work—Here's an interesting 40-pp booklet covering the properties and applications of molybdenum disulfide, showing not only how it is being used in a wide range of lubricating jobs, but describing the form utilized and including comments on its performance. Fully illustrated, arranged in easily-followed chart form. Climax Molybdenum Co.

149 ABC of Molybdenum Lubrication—"Abstracts, Bibliography and Case Histories of Liqui-Moly Lubrication" (Technical Bulletin 21-G) contains a listing of current reference literature, with important articles abstracted, a list of pertinent patents, and a summary of two years of case histories of applications of molybdenum-disulfide lubricants. Also describes various forms in which Luqui-Moly lubricants are offered. The Lockrey Co.

DUST COLLECTING

150 Cloth-Bag Dust Collector—Eight-pp Bulletin 914 introduces company's new cloth-bag dust collector for carbon black, cork, fine wood, graphite, pigments, lime, soap, metal oxides. Generously illustrated, tells how collector works, is installed and maintained. Gives specifications, standard collector sizes. Tells how collector can be inspected and maintained from a walkway between bags. Bag construction (seams forming six tubes having a common opening in each bag) is outlined and pictured. Air circulation and details of mounting collector for various types of disposal are also illustrated. Pangborn Corp.

151 Industry Report on Dust Collectors—The application of cloth-type dust collectors to the manufacture of roofing materials is presented in Bulletin 322, in which special attention is given to the ventilation of mica and scrap recovery. By means of hooding and duct work, the collectors trap dust at its source. Photos and flow diagrams illustrate these case histories, and figures on savings effected by cloth filtration are included. American Wheelabrator & Equipment Corp.

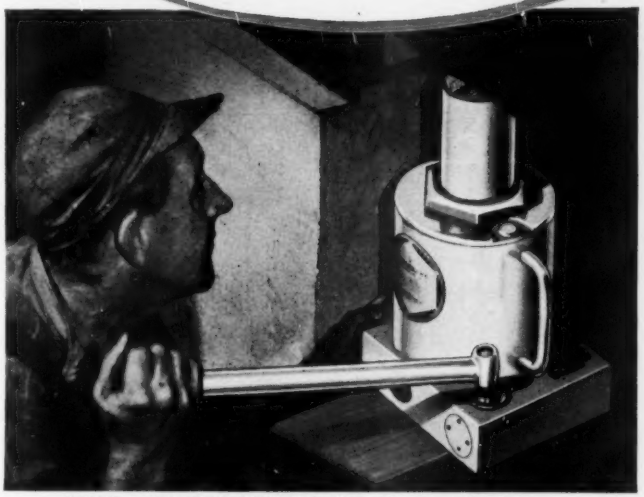
METALS

152 Spark Test Guide — For checking identity of tool and die steels, this 20-pp booklet features individual spark diagrams of 13 standard tool and die steels, supplemented with detailed spark characteristics for each steel. This guide helps identify tool and die steels to be sold for scrap, and aids in classifying steels that have lost their identity in stock. It can also be used to double-check the type of steel before making a tool or die to make sure it's the right grade. Booklet gives instructions for dressing the grinding wheel and preparing the steel sample. The Carpenter Steel Co.

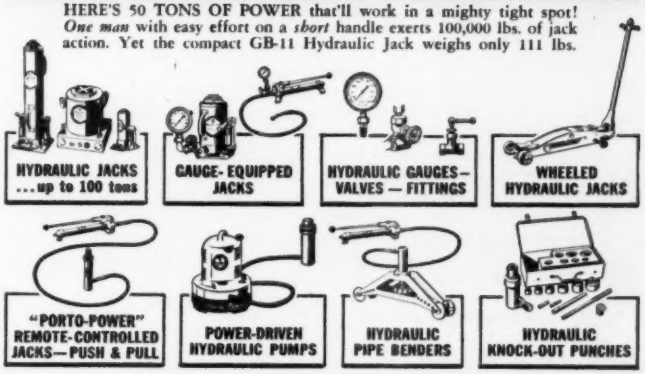
153 Lead Clad Metals—A 22-pp booklet, "The History and Development of Ferrolum Lead Clad Steel and Cupralum Lead Clad Copper," presents a solution to corrosion problems as they exist during the manufacture, transportation, storage and processing of sulfuric acid, as well as information on two mediums well suited to the handling and processing radio-

Pick the right jack for the job

...from the world's most complete line of hydraulic equipment



HERE'S 50 TONS OF POWER that'll work in a mighty tight spot! *One man* with easy effort on a *short* handle exerts 100,000 lbs. of jack action. Yet the compact GB-11 Hydraulic Jack weighs only 111 lbs.



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BLACKHAWK

Save buying time when you need hydraulic equipment. Specify Blackhawk—and be sure you'll get the hydraulic tool that will match your requirements exactly. Order from leading supply houses. Write for free catalogs. Products of Blackhawk Mfg. Co., Dept. J-4952, Milwaukee 1, Wisconsin.

Koiled Kords*

BEFORE

eliminate wire jungles

AFTER

and increase efficiency

*TRADEMARK

"Before and after" pictures courtesy the Miller Company, Meriden, Conn.

Get rid of that tangled, jumbled jungle of inefficient wiring on electrical tools that move. Use Koiled Kords in the plant or on your products and increase efficiency, minimize accident hazards and cut replacement costs.

Koiled Kords are neoprene jacketed electric cords of high quality that are permanently coiled into a spring-like shape which provides for extension and retraction.

Koiled Kords are made with from one to six conductors and may be purchased in mandrel lengths four feet long and used just like straight cords are used. When required Koiled Kords are made to customers' specifications in combination of coiled and straight lengths with or without terminals.

For specific information for your own application of Koiled Kords write in full detail. Koiled Kords will be glad to work with you.

Koiled Kords
INCORPORATED

BOX K, HAMDEN, CONN.

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active materials. Interesting, readable text covers properties of these metals, comparisons with sheet lead and lead pipe. Separate chapters are devoted to Cupralum lead clad copper coils, and electro-Cupralum anodes. Knapp Mills, Inc.

154 Lined Against Corrosion—This bulletin explains how company's economical Lectro-Clad process provides corrosion-resistant linings (nickel or other metals) in pipe, tubing, fittings. Shows how the electro-plated coating becomes an integral part of the pipe. Pictures some available fittings, gives sizes of pipe and tubing supplied. Includes data sheets covering welding procedure, specifications. Bart Mfg. Corp.

Use the post cards on pages 35-36 and 173-174 for listing item numbers of the bulletins you want.

TOOLS, SOLDERING

155 For Longer Tool Life—This 64-pp pocket-size booklet is an excellent saw, tool, and file manual, describing briefly how to choose and use these hand tools to best advantage and keep them in good condition. Some of company's tools are pictured and described. Also discussed briefly are common types of hardwood and softwood, and there's an interesting account of the saw in history and how saws are manufactured today. Henry Disston & Sons, Inc.

156 Condensed Data on Bar Solders—Here's a novel, but informative, blotter for a plant engineer's desk. Attached to it is a 2½-by-2½ in. 24-pp booklet filed with pictures and captions comparing the hand and machine methods of making bar solder. When the blotter is used up, the little booklet can be detached and filed away. Federated Metals Div., American Smelting and Refining Co.

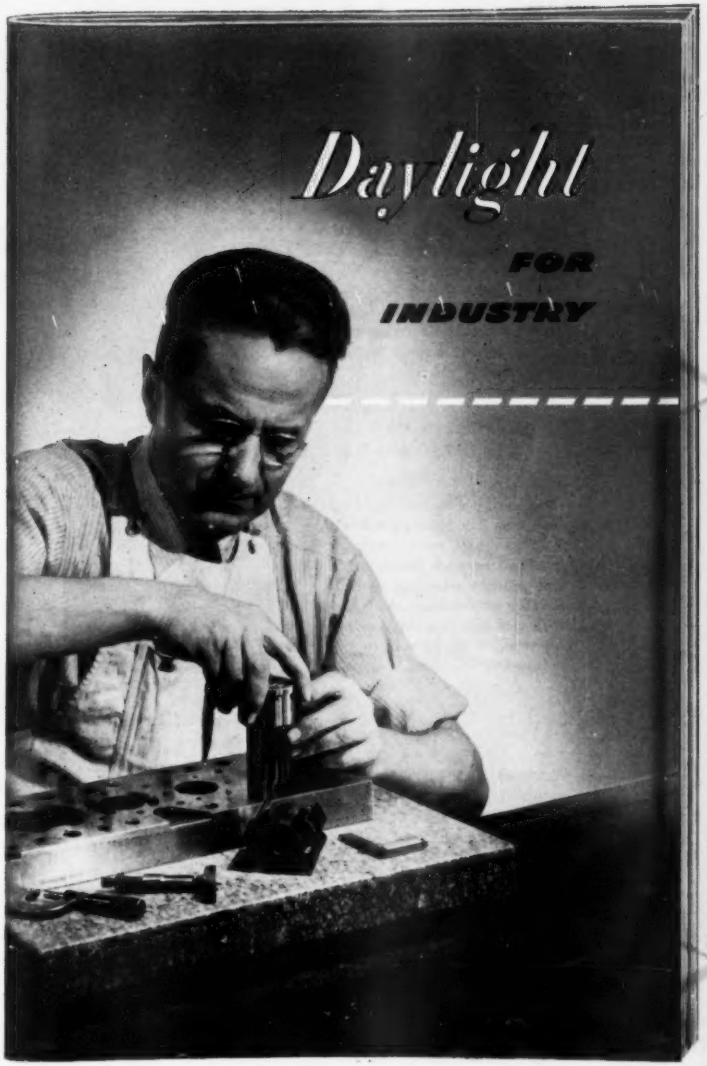
157 For Close-Quarter Soldering—Bulletin GED-1538, describes a new lightweight soldering iron, designed for use where high-speed pinpoint soldering must be accomplished in close quarters. General Electric Co.

158 Stud Driver—Special operating features of company's Model 450, a self-powered quick fastening tool, are detailed in Form 937A. Photos show how the driver is used and picture it in action. Industrial Tool Div., Remington Arms Co., Inc.

MECHANICAL POWER TRANSMISSION

159 Belting Manual—A practical text on leather belting, Catalog 101, 40 pp, not only lists various types and grades of belting best adapted for each drive, but also shows how to get longer life from belting through proper care, how to make a belt endless, and gives other useful information. Provides charts and tables on horsepower ratings, speeds, specifications of controlled tension bases, together with formulas that will help a plant engineer figure belt requirements for new and existing installations. Also contains sizes, prices, other ordering information. Graton & Knight Co.

160 FHP Gear-Motors—Eight-pp Bulletin GEA-5678 lists 61 standard models of fractional horsepower gear motors, describing their applications. Outlines a simple method of determining correct horsepower requirements with the use of an ordinary pipe wrench and fish scale. Contains descriptions, cutaway drawings, selection charts, and dimension tables for both concentric-shaft and right-angle shaft gearmotors, includes maintenance pointers. General Electric Co.



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Here's a new booklet with the latest information on plant daylighting. If you're concerned with lighting, it should be "must reading." Nontechnically written, in easy-to-read form, "Daylight for Industry" brings you all of the important facts and fundamentals of daylight control.

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of least resistance

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Kilroy Structural Steel use 17 R & M hoists, and have on order two R & M cranes to help them handle more steel more efficiently. Write for the Kilroy report—it may be the answer to your problem.

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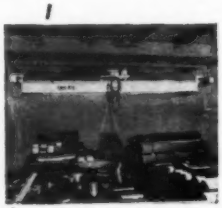
Modern Tool & Die Co. find their nine R & M hoists and two R & M cranes on a systematic overhead network handle stock and product transport without sacrifice of floorspace, and give their men effortless aid on assembly work. Write for your copy—ready soon.



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Automatic Die & Products Co. reduce time, labor, and maintenance costs with an R & M crane unloading incoming steel, and a Trambeam mounted hoist moving scrap from their plant. Want to handle greater tonnage in less time? Don't miss this report—ready soon.

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MOTORS HOISTS CRANES FANS MOYNO PUMPS

HOIST AND CRANE DIVISION, SPRINGFIELD 99, OHIO

161 Electric Power Drives — This well-illustrated 20-pp comprehensive catalog contains complete descriptive information on variable speed drives, geared motors and constant normal speed motors in drip-proof, splash-proof, totally enclosed and pipe ventilated designs. Sterling Electric Motors, Inc.

PIPING ACCESSORIES

162 Pipe Insulation—Form 76-102 is a small folder stressing efficiency and economy of Amocel, a lightweight asbestos pipe insulation for temperatures to 650 F. Discusses its low thermal conductivity, high mechanical strength in relation to its weight, and physical stability. Union Asbestos & Rubber Co.

163 Small Purifiers—Six-pp Bulletin 500 describes company's small line type Hi-eF purifier used to clean up small pipelines carrying live or exhaust steam, vapors and air. Discusses advantages resulting from use of these purifiers, including increased production efficiency, lower maintenance costs and improved products. Also contains diagrams of typical installations, specifications and prices. The V. D. Anderson Co.

SPECIAL FURNISHINGS

164 Planned Storage Efficiency—Bulletin 5221 presents steel storage racks for drums, barrels, crates, bins, skids and pallets, with all applications illustrated by installation views. Demonstrates how storage rack systems solve need for more storage space without cost of new buildings. Racks pictured multiply storage capacity of floor space several times by storing materials and goods right up to the ceiling. Barrett-Cravens Co.

165 Tables and Benches—This brochure presents complete data on a folding table and bench service, including architect's specification and accessory information. An exploded view of the equipment, listing parts and detailing construction is incorporated. Stresses suitability and economy of this table where there is need for a rapid setup and dismantling of service equipment. Seating Inc.

166 Chairs for Work — Eight-pp illustrated Form 704-1 serves as ordering guide for a comprehensive line of steel posture chairs and stools and includes selection suggestions. Comfort and durability features are explained. Adjustable and stationary models, backless and various types of backs are presented, including stools for general plant use as well as special models. Standard Pressed Steel Co.

167 Pick-Up Go-Cart—Besides getting a plant engineer around to the job quickly, the Autoette pick-up described in this small folder can be used for all types of light hauling. Stresses easy handling, other outstanding features of this 500-lb capacity all-electric car, includes specifications. Autoette Div., Blood Sales Co.

168 Stronger Industrial Padlocks — This illustrated bulletin features cylinder key padlocks, with steel ball locking mechanism which affords plus protection against force, blows, files. Explains how these tough padlocks can't be released from shackles until the double-bitted cylinder key is inserted. Specifications, prices given for several models. Also described are safety hasps with built-in cylinder lock, and combination padlocks with independent key control feature. Junkunc Brothers.

169 Need Markers?—This 50-pp full-line product catalog covers wire markers, pipe markers, safety signs, reflective signs, masks and stencils, and printed roll tape. Serves as a working handbook depicting through illustrations, specifications, job applications exactly how these self-sticking products help to reduce costs, save time and speed production. Prices included. W. H. Brady Co.

WATER CONDITIONING

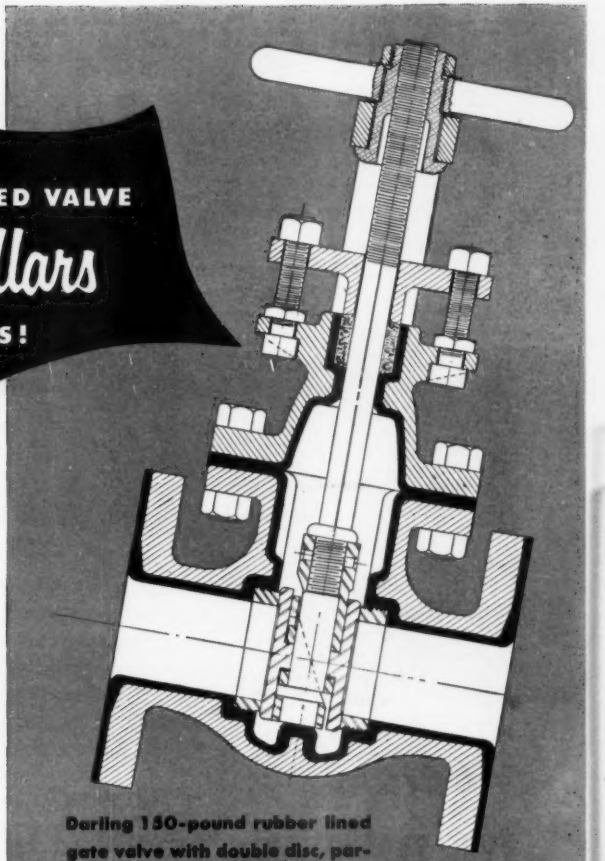
170 Water Treatment Unit — Bulletin 1845. 8 pp. describes the JBAS Accelator, a packaged water treatment unit to treat

HOW THIS RUBBER LINED VALVE

stretches dollars

IN CORROSIVE SERVICES!

it's a DARLING fully revolving double disc iron body gate valve



Darling 150-pound rubber lined gate valve with double disc, parallel seat feature, assuring long life and tight closure. These rubber lined valves are available in rising stem, cylinder or motor-operated, or quick-opening types.

IN many corrosive services up to 180° F, Darling hard rubber lined iron body gate valves are taking the place of costly special alloy valves . . . saving plenty of dollars!

And when it comes to year-in, year-out behavior, they can't be beat! A proved bonding technique permanently prevents separation of the hard rubber lining from the valve body. All interior working parts are made of alloys suitable for the corrosive conditions involved.

Equally important, these valves feature Darling's fully revolving double disc parallel seat principle. This, combined with the equalizing wedges, means easy, *tight* closure even if seats are not parallel due to line stresses. It means *uniform* distribution of wear for prolonged life with minimum maintenance cost.

SEND FOR DATA. A bulletin covering Darling rubber lined *gate* and *check* valves is yours for the asking. In addition, Darling parallel seat revolving disc gate valves are available in a wide range of sizes and constructions for all kinds of normal and unusual service, and for pressures up to 1500 pounds. We'll gladly furnish specific recommendations on the proper valves for your particular service.

DARLING VALVE & MANUFACTURING CO.

Williamsport 14, Pa.

Manufactured in Canada by Sandilands Valve Manufacturing Co., Ltd., Galt 19, Ontario

FOR PLUS VALUES, JOB-PROVED AGAIN AND AGAIN

5 to 100 gpm. for boiler feed, engine cooling, softening of process water. Explains how this equipment softens, clarifies, sterilizes or removes organic matter, tastes or odors. Infilco Inc.

171 Hot Process Water Softeners—Bulletin 2341, a 32-pp booklet, is crammed full of interesting data on the hot process treatment of boiler feedwater. A number of designs are illustrated and discussed, including conventional and sludge-blanket types, with and without built-in deaerating equipment. Also described is the new two-stage hot process lime and zeolite softener for securing boiler feedwater that is low in alkalinity and silica content and zero in hardness. The Permutit Co.

OTHER EQUIPMENT

172 Job-Conditioned Gloves — Jomac fabric gloves especially designed for regular plant jobs, for hot and heavy jobs, and for extra tough handling jobs are presented in this bulletin. Tells how these gloves are made to protect hands, may be washed or dry cleaned, and give long service. Also describes hand pads and cutting-resistant Glov-Safers for use over gloves or bare hands. C. Walker Jones Co.

173 Packaged Cooling Towers—Cotospray Bulletin 5.8.083 describes a line of low-cost packaged redwood cooling towers. Contains data and charts to aid in selection of correct model of these prefabricated towers. Models are atmospheric type. Equipment Div., F. J. Pritchard & Co.

174 Asbestos Products—This 6-pp folder provides in brief, a pictorial resume of company's acoustical materials, blankets, cements, cloth, felts, gaskets, insulation, packings, pipe covering, sound proofing and other materials. Tells something of the facilities of company's seven plants and discusses specialized products and services. Union Asbestos & Rubber Co.

Balance

your ventilation;

get ample fresh air intake capacity

with Swartwout Airlouver

Custom-made for each job *without premium cost*, this weatherproof system provides unusual advantages — has better-than-average free opening area. The wide range of odd-size units available through our unique manufacturing procedure makes easy and economical the filling of any size opening. Overlapping blades are mounted in sturdy formed channel frame. Adjustable style features positive closing and quick change of blade position to any variation between open and closed. Airlouver is made in fixed-blade style also. Write for Bulletin 339 D.

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Roof Ventilators and Ventilating Louvers

POWER PLANT EQUIPMENT • PROCESS INDUSTRY CONTROLS

See pages 35-36 and 173-174 for postage-free mailing cards. List item numbers of bulletins wanted.

175 Industrial Hydraulic Symbols—The 32-pp "JICircuit Guide" was developed to simplify use of JIC symbols in hydraulic circuit diagrams. Explains and illustrates use of these symbols, providing not only a list of hydraulic standards for industrial equipment approved by the Joint Industry Committee, but also a key to all of company's equipment. Covers a wide range of valves, also pumps, fluid motors. Included with booklet is a plastic template to be used with the guide, which is available without charge to qualified plant engineers. Please state your job title when requesting this guide. The Dennison Engineering Co.

176 Faster Steam, Lower Cost — Form C-10 is a 12-pp illustrated booklet describing company's self-contained forced recirculation steam generator. Gives details on specific industrial applications of the equipment in reducing costs while automatically supplying a dependable volume of steam at constant levels of temperature and pressure. The use of single and multiple installations is covered and operational data given. Clayton Mfg. Co.

177 Ring Packing — Eight-pp Bulletin MP-68 describes company's Palmetto G-T ring, a packing being used in many applications, at pressures to 15,000 psi, without extrusion of the packing. Text and illustrations give detailed facts on design features, operational data, installation procedures. Greene, Tweed & Co.

178 For Low Cost Listing—Flexoprint, a new method of preparing price and parts lists and other listings where accuracy is essential is described in 6-pp Bulletin KD 610. Flexoprint permits quick changes simply by adding or removing typewritten cards; lists are easily maintained, always ready for printing. Remington Rand Inc.

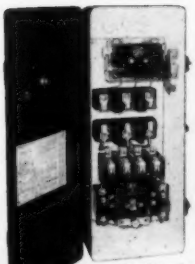
179 Fan and Blower Data—This recently issued catalog includes ordering information, prices and engineering data covering 30 fan types in over 300 sizes. Provides complete specifications, dimensions, installation diagrams and photos, as well as extensive information on how to select and install fans for industrial requirements. Chelsea Fan & Blower Co., Inc.

180 Abrasive Materials—"20th Century, the Persuasive Abrasive," is the title of illustrated Catalog 152, 8 pp, covering company's line of shot, grit and iron powder. The uses, advantages and proper selection of the abrasive are explained. The Cleveland Metal Abrasive Co.

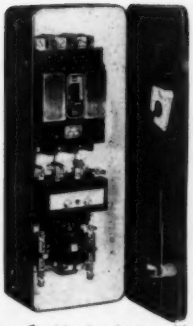
181 Protective Membranes—This 16-pp illustrated booklet on plastic and rubber linings is offered to assist plant engineers in providing equipment best suited to withstand corrosion. Describes briefly five Laybond protective membranes, gives engineering specifications on welded tanks and other parts for rubber lining and/or covering. Describes other uses for the linings. Includes helpful corrosion resistance chart for selecting right lining for specific problems. Acme-Fisher Div., Broadway Rubber Corp.

182 What's a Silicone?—Non-technical, but one of the most informative, attractive and interesting publications on silicones, this 36-pp booklet discusses silicones from the standpoint of what they can do, how they act and why they offer so much to modern living. Clearly illustrated, text covers silicone polishes, water repellents, fluids, lubricants, release agents, defoamers, coatings, electric insulation, and Silastic. Dow Corning Corp.

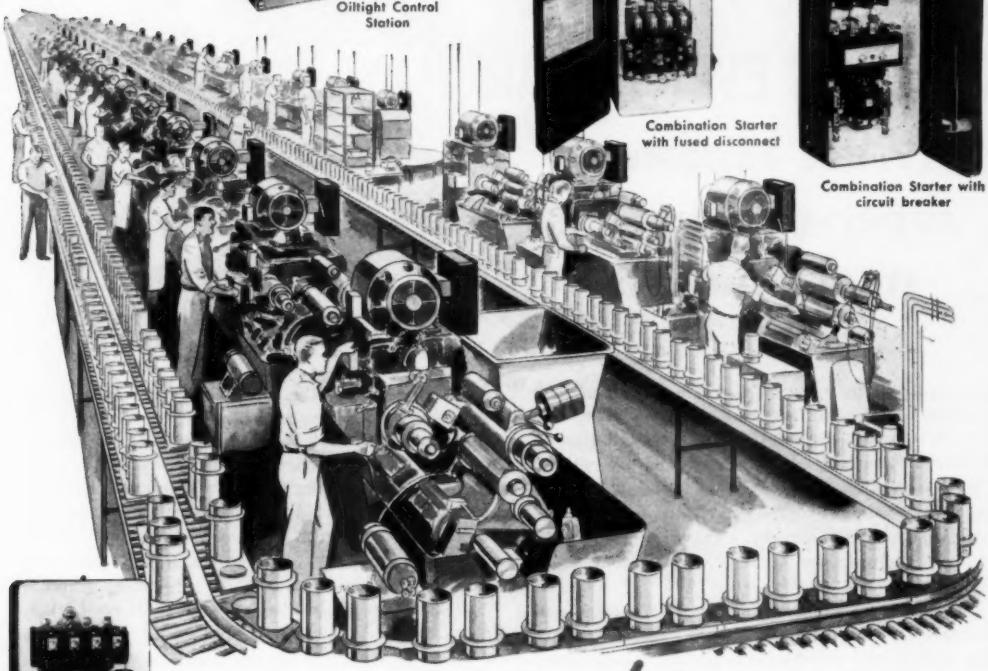
Oiltight Control Station

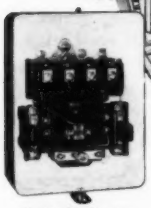


Combination Starter with fused disconnect



Combination Starter with circuit breaker





Solenoid Starter

Manual Starter

Manual Switch

To Keep Your Plant *Humming*

Install these TROUBLE FREE Motor Controls

Quality motor controls permit you to maintain continuous operation of your electric-powered equipment . . . keep your plant humming under heavy production schedules.

The simple, time-tested design of Allen-Bradley automatic starters is a guarantee of millions of trouble free operations. Allen-Bradley automatic starters are so trouble free because they have no pivots, pins, bearings, intricate linkages, or flexible shunts. Also, the reliable straight up and down solenoid motion is frictionless. Furthermore, reliable double break silver alloy contacts require no maintenance.

Hundreds of thousands of Allen-Bradley automatic starters in use attest to their high acceptance by industry. For trouble free motor control, specify Allen-Bradley.

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SOLENOID MOTOR CONTROL

QUALITY

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SAVE THOUSANDS OF DOLLARS EVERY YEAR

...use Fenestra super-galvanized steel windows

No more bills for the expensive time and labor and materials involved in painting windows every few years. Save thousands of dollars every year by insisting on Fenestra* Super Hot-Dip Galvanized Steel Windows!

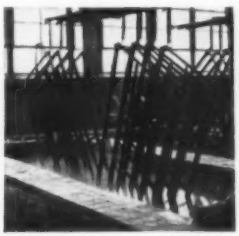
Here's why they are called *Super* Galvanized: Fenestra has developed a Hot-Dip Galvanizing system designed specifically for steel windows, and has built a special plant around it. It is the only one of its kind in America.

Completely automatic controls move Fenestra window assemblies through a series of special tanks where they are cleaned and pickled, rinsed, fluxed, dried, galvanized and Bonderized. Timing, temperatures—every step—is laboratory controlled.

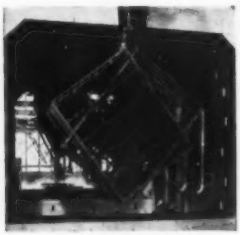
So add Super Hot-Dip Galvanizing to your present list of Fenestra advantages... such as integral ventilator butts that increase window strength, precision machining of window bars for perfectly uniform window size, automatic assembly of ventilators for perfect permanent fit, continuous double contact for weather-tightness all around vent openings, rigid *interlocking* muntin joints.

And, remember, Fenestra's volume production, permitted by standardization of types and sizes, gives you high-quality Fenestra Steel Windows at remarkably low cost.

Call your Fenestra Representative or write Detroit Steel Products Company, Dept. PE-5, 2280 East Grand Boulevard, Detroit 11, Michigan. *®

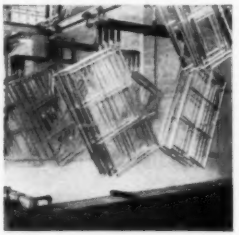


FLUXING. After cleaning, pickling and rinsing, Fenestra Windows dip into a flux bath that provides a film to prevent contamination of the cleaned steel as it passes to galvanizing tank.



DRYING. In this oven, the flux is dried on. Of course, in the galvanizing tank, this protective coat of flux volatilizes on contact with the molten zinc to permit a strong zinc-iron bond.

GALVANIZING. Assemblies dip deep into molten zinc, and come up with a heavy, smooth, uniform coating. Temperature and timing are automatically controlled with laboratory accuracy.



BONDERIZING. Here you see the galvanized assemblies being Bonderized to give the surface a soft silver color and to provide a holding surface for decorative paint, if it is ever desired.

Fenestra SUPER HOT-DIP GALVANIZED STEEL WINDOWS

from America's first plant especially designed to galvanize steel windows

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BULLETINS

BEGINS ON PAGE 35
Describes new, free commercial literature. Use post card to list item numbers of bulletins.

DATA FILE

BEGINS ON PAGE 175
Reviews manufacturers' free general catalogs. Use card to list item numbers of those wanted.

NEW PRODUCTS

BEGINS ON PAGE 122
Tells what's new in equipment. Manufacturers will furnish more information on products.

ADVERTISERS' INDEX

BEGINS ON PAGE 202
Helps you find advertised products quickly. Use post card to ask for free literature offered.

PERSONALIZED SERVICE

Use post card to ask for data on an article . . . tear sheets . . . name of a manufacturer . . . or help with a problem.

Index to Literature Offered in Data File

Air Conditioning	*Page 176*	*Maintenance*	*Page 176*
Construction	*176*	*Materials Handling*	*175*
Controls	*186*	*Mechanical Power Transmission*	*188*
Dehumidifying	*175*	*Packing*	*182*
Dust Control	*176*	*Piping and Accessories*	*184*
Electrical	*178*	*Pumps and Pumping*	*180*
Fuel Oils	*180*	*Refractories*	*182*
Gaskets	*182*	*Tools*	*175*
Instruments	*186*	*Traps*	*184*
Insulation	*182*	*Valves*	*184*
Lighting	*180*	*Ventilating*	*175*
Lubricants	*180*	*Vibration Control*	*175*
Magnets	*188*		

Catalogs describing other equipment, not classified ..... *Page 190*

MAY, 1952

Card void after 6 months.

PLANT ENGINEERING

Please have manufacturers send without obligation information or bulletins indicated by following numbers.

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Please Print or Typewrite

Your Name . . . . . .

Your Title . . . . . .

Your Company Name . . . . . .

Company Address . . . . . .

City . . . . . State . . . . . .

(If you prefer delivery at your home also fill below)

Home Address . . . . . .

City . . . . . State . . . . . .

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Also, use this card for more information on advertised products.

5 Star Reader Service . . . Plant Engineering keeps you posted!

THE POST CARD at bottom of this page and the one on pages 35 and 36 are for your convenience in asking for literature and information. Just fill them in, tear out and mail. NO POSTAGE NEEDED.

Index to Literature Offered in Data File

Air Conditioning	*Page 176*	*Maintenance*	*Page 176*
Construction	*176*	*Materials Handling*	*175*
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Catalogs describing other equipment, not classified ..... *Page 190*

BULLETINS

BEGINS ON PAGE 35 Describes new, free commercial literature. Use post card to list item numbers of bulletins.

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CHICAGO 3, ILLINOIS

DATA FILE of literature for the plant library

STANDARD CATALOGS, bulletins and handbooks are listed to help plant engineers maintain a permanent data file. Following catalog descriptions are handy page references to advertisements giving information on related subjects.

MATERIALS HANDLING

201 Shovel and Loader — Described in 12-pp Bulletin 1032 is a hydraulic crown and hoist shovel and loader incorporating mechanical features usually associated with big shovels. Illustrates, gives specifications, application information on both pneumatic traction and crawler traction models. Dempster Bros., Inc.
See ad on pages 10-11 for information on other dumping, loading equipment.

202 Materials Handling Equipment — Illustrated Catalog F-602 is a 44-pp guidebook on materials handling equipment for industrial plants. Subjects covered include description and application data on company's gas and electric fork lift trucks, motorized hand trucks, hand lift trucks and hand and electric hoists. The Yale & Towne Mfg. Co.
See ad on page 59.

203 Feeders, Conveyors — An excellent presentation of electric vibrating feeders and conveyors is given in 90-pp Catalog 830 covering manufacturer's line of equipment for handling a wide variety of wet and dry materials and including large and small capacity units, for temperatures of -30 to 2000 F. Explains principles of design, operations. The Jeffrey Mfg. Co.
See ad on page 37 for information on apron conveyors.

204 Conveyor and Elevator Belts—This 26-pp collection of catalog sections illustrates parts used in construction of company's conveyor and elevator belts. Discusses increased service life and decreased maintenance. The B. F. Goodrich Co.
See ad on page 3 for information on grommet V-belts.

205 Metal Conveyor Belts — This 24-pp booklet is an illustrated guide to selection of metal conveyor belts. Presents both conventional and balanced spiral weave belt; covers raised edge and flight constructions, chain edge constructions, high temperature belts, wire conveyor aprons. Wickwire Spencer Steel Div., The Colorado Fuel & Iron Corp.
See ad on page 199.

206 Conveying Systems Manual — Unloading and conveying of dry pulverized material are discussed in 4-pp Bulletin FK-25. Text covers system and operation; stationary pump, accessories. Fuller Co.
See ad on page 138.

207 Handbook on Overhead Conveying Systems — Manual A-56 provides 200 pp of information on overhead track systems and conveying equipment. Pictures installations, construction details; gives engineering data. Richards-Wilcox Mfg. Co.
See ad on page 176.

208 High-Lift Trucks — Bulletin 5143, 12 pp, describes and pictures company's Powerox Hi-Lift electric trucks in tilting and non-tilt fork types, platform and straddle types, of 2000-lb and 4000-lb capacities. Barrett-Cravens Co.
See ad on page 143.

209 Drawbar Pull Tractor — Manufacturer's newest Shop Mule, a 12,000 lb, drawbar pull tractor with torque converter is presented in Bulletin 1545. The Buda Co.
See ad on page 137 for information on fork trucks.

210 Safe Truck Operation — "Safety Saves!" is a 24-pp booklet setting forth "do's" and "don't's" established as a practical code of truck operation. The admonitions, pointed up by cartoons, serve as both "refresher course" and text. Industrial Truck Div., Clark Equipment Co.
See ad on page 193.

212 Portable Hoists — This bulletin describes a lightweight air hoist in 2000, 1000, 500 and 300-lb capacities. Gives specifications, dimensions. Keller Tool Co.
See ad on page 182.

214 Fast-Working Hoists — Bulletin W-815-B, 6 pp, provides electrical details on company's hoists — on wiring, brakes, motors and fast-operating, push-button controls. Standard outrig, and multi-speed controls, limit switches are described. Hoist & Crane Div., Robbins & Myers, Inc.
See ad on page 168.

216 Electric Hoist Manual—Catalog 215-B offers 38 pp of engineering, application and ordering information on company's Load Lifter electric hoists. Presents hoists with hand operated trolleys and with power travel, hoists with lug suspension, hook suspension and push-type trolleys, and with hand-geared trolleys, hoists for low head. Manning, Maxwell & Moore, Inc.
See ad on page 184.

217 Single Drum Hoist—Sixteen-pp Bulletin 76-X describes single-drum, portable multi-purpose hoists for industrial plants, construction work. Joy Mfg. Co.
See ad on page 29 for information on compressors and vacuum pumps.

218 Trolley Hoists—Bulletin DH-269, 2 pp, describes and pictures ½ to 3 t capacity army-type trolley hoists, plain or geared, for use where a close headroom assembly is required. Gives dimensional and capacity data, prices. Wright Hoist Div., American Chain & Cable Co., Inc.
See ad on pages 52-53.

219 Manual on Electric Hoists—Catalog H-46, 44 pp, covers monorail and stationary hoists and car pullers. Explains fundamental types of grabs, methods of hanging I-beams, types of hoist suspension, controls. American Engineering Co.
See ad on page 139.

220 For Efficient Overhead Handling—Bulletin C-1, 56 pp, pictures overhead equipment for practically all industries. Stresses construction, safety, electrical advantages of trolleys, cranes, track and auxiliaries. Includes layout information. The American MonoRail Co.
See ad on page 30.

221 Data on Tramrail Equipment — Twelve-pp Form 2008F is a recently revised booklet on tramrail systems. Tells what an installation can do toward improving handling efficiency. Rail and arch design, switches, cranes and transfer bridges, carries, hoists, cranes, buckets, grabs are pictured. Cleveland Tramrail Div., The Cleveland Crane & Engineering Co.
See ad on inside back cover.

222 Hydraulic Jacks—Hand, wheeled and gage-equipped jacks from 1½-t capacity models to 100-t capacity extra-heavy duty jacks are covered in Catalog J-50, 16 pp. Illustrated, includes specifications, selection information. Blackhawk Mfg. Co.
See ad on page 165.

223 Electric Lifters—Medium and heavy-duty electric lifters are described and illustrated in Bulletin LU50. Company's ball bearing hoisting unit is discussed. Economy Engineering Co.
See ad on page 202.

TOOLS

226 Pipe Tool Ordering Guide—Catalog 2-51, 8 pp, covers company's line of threaders, cutters, vises, dies, tongs and wrenches; gives sizes, prices. Armstrong Bros. Tool Co.
See ad on page 188.

227 Pipe Tool Book—This catalog and data book gives information on pipe and bolt machines, power units, ratchet threaders, reamers and cutters, other power and hand tools. Includes popular "operating guide" section, fully illustrated with easy-to-grasp drawings. Beaver Pipe Tools, Inc.
See ad on page 200.

228 Radial Arm Saws—This 12-pp catalog describes company's full line of radial arm saws for industrial, other uses. Complete specifications of four models given. Special accessories are illustrated. Delta Power Tool Div., Rockwell Mfg. Co.
See ad on page 145.

229 Tube Working Handbook — Form 369-A is a 32-pp booklet on tube working tools. A section on modern tube working practices covers handling, cutting, flaring, reaming, refacing of fittings, bending, soldering and other operations. Company's line of tools is described along with selection and application information. Booklet is generously illustrated with photos, drawings. The Imperial Brass Mfg. Co.
See ad on page 199.

230 More Holes in a Hurry—Form 2400 is a 36-pp pocket-size booklet which not only provides ordering information on manufacturer's drills, but also gives some excellent tips on how to get the most service from portable electric drills. Discusses motor, drill cord, drill chuck, right and wrong drill bit grindings, drilling of various materials, and drill maintenance. Includes tap drill sizes. Mall Tool Co.
See ad on page 192 for information on other tools.

231 For Faster Fastening — Form 35-A explains and illustrates company's system of fastening tools and fasteners for use with steel, wood, concrete, fabricated hard materials. Ramset Fastening System, Inc.
See ad on page 195.

232 Metal Spraying Gun — Company's Type 4E gun for high-speed spraying with all metals is described in Bulletin 94. A cutaway drawing shows construction features of the gun which is designed for tool-post mounting or hand operation. Metallizing Engineering Co., Inc.
See ad on page 119 for information on metallizing.

234 Standard Screw Products—This 10-pp booklet about "Unbrako" standards tells what they are and the advantages of their use. Gives detailed information on socket head, cap screws, self-locking socket set screws, socket set screw points, flat head socket cap screws, shoulder screws or stripper bolts. Standard Pressed Steel Co.
See ad on page 135 for information on work benches.

VIBRATION CONTROL

235 Simplified Isolation — A simplified method of machine isolation which utilizes pads and cement is described in this small folder. Explains how it reduces maintenance cost, can be used for complete plant installations. The Felters Co.
See ad on page 153.

236 Vibration Control—Advantages and limitations of spring mountings, rubber mountings and cork materials in the control of vibration, together with data on their use are given in Bulletin G-102. Loading ranges given. Korfund Co., Inc.
See ad on page 186.

VENTILATING, DEHUMIDIFYING, AIR CONDITIONING

237 The Cost of Excess Moisture — Thirty-pp Bulletin 216 explains that while high humidity doesn't show it can spoil many products in process and storage. Tells how typical plants have solved the excess moisture problem by electric dehumidifiers. Pittsburgh Lectrodryer Corp.
See ad on page 64.

238 Controlled Ventilation — Bulletin DV-31-51 contains illustrations, construction details, capacity ratings and dimensions on company's Panel Vent sets for use at free delivery or relatively low static pressure. Units described have fan wheels of 24-, 30- and 36-in dia. DeBothezat Fans Div., American Machine & Metals, Inc.
See ad on page 34.

239 How Conditioning Units Can Help—The advantages of self-contained units in

cooling, dehumidifying, cleaning are cited in 40-pp Catalog 1307. Explains installation, operation. Provides data on direct expansion and cold water cooling, hot water, steam heating. Clarage Fan Co.
See ad on page 128 for information on induced draft fans.

DUST CONTROL

240 Vacuum of Many Jobs — Bulletin 144, 20 pp, describes and illustrates 132 unusual industrial uses for company's vacuum system. The Spencer Turbine Co.
See ad on page 54.

241 Dust Control Technology — Detailed selection, operation and maintenance data are contained in this 50-pp digest-size book, "Industrial Dust Control Through Exhaust Systems." Treats exhaust hoods, piping systems, dust collecting equipment, exhausters and drives. Lists basic methods of dust control and analyzes elements of exhaust systems. Discusses control of air movements. Pangborn Corp.
See ad on page 34.

242 Dust Recovery — "Engineered Efficiency in Dust Collection and Recovery," 36 pp, discusses industrial dust recovery from standpoints of nuisance abatement, waste avoidance, hazard elimination. Shows effect of variation in particle size distribution and specific gravity of dust on efficiency. Buell Engineering Co., Inc.
See ad on page 124.

243 Dust Collectors — Operation, construction, versatility and maintenance of company's unit dust collectors are explained in this bulletin. Includes capacities, sizes. The Kirk & Blum Mfg. Co.
See ad on page 107 for information on fume control system.

244 Industrial Dust Control—In addition to citing several examples of how company's Dustube collectors are solving the dust control problem in different industries, Vol. 1, No. 1 of Industrial Ventilation explains merits of cloth filtration. American Wheelabrator & Equipment Corp.
See ad on page 178.

245 Dust Control—Bulletin 98 explains value of industrial dust control and principles of dust suppression, collection by filtration. Describes dust control equipment, providing specifications, dimensions on filters, systems, automatic controls. The W. W. Sly Mfg. Co.
See ad on page 184.

MAINTENANCE

246 One-Coat Insulation — This 32-pp booklet describes company's Type D insulation, a sprayed-on coating for surfaces with temperature range from —40 to 300 F. Tells how one application of this coating not only insulates but also waterproofs, rustproofs, deadens sound, prevents condensation and resists fire. Tells how to apply, discusses K factor, bonding properties. Insul-Mastic Corp. of America.
See ad on page 43.

247 Roofing Manual—Engineering data on roofing is given in Specifications 50, 30 pp. Covers coal tar pitch roofings, waterproofings, insulations, flashings, protective coatings. Includes illustrated instructions. Tar Products Div., Koppers Co., Inc.
See ad on page 130 for information on corrosion resistant coatings.

248 Corrosion-Preventive Coatings—This 16-pp illustrated booklet covers a family of products for fighting corrosion. Presents characteristics and application data on hot and cold applied tar base coatings, alkyd resin coatings, chlorinated rubber base coatings, vinyl and phenolic coatings. Includes finder chart. Protective Coatings Div., Pittsburgh Coke & Chemical Co.
See ad on page 31.

250 Floor Maintenance—This 12-pp brochure presents a complete and economical program for the care of wood and concrete floors, terrazzo, linoleum and tile. Points discussed include wear resistance, appearance, sanitation, cleanliness, light reflectance, sealers and hardeners, burnishing and buffing. The Trexnco Mfg. Co.
See ad on page 182 for information on roof maintenance.

251 For Floors That Take Beatings—Twelve-pp illustrated booklet, "Why Engineer an Industrial Floor," points out why installation of industrial floors for maximum life and minimum cost is a task requiring experienced planning, skilled execution and exacting cost control. Describes how floors can be engineered to withstand moving and deadweight loads, shock and vibration, extreme temperatures, oils, chemicals, etc. Flash-Stone Co., Inc.
See ad on page 19.

252 Power Brushes—Bulletin C-269, describing company's new power brushes, pictures their design. The Osborn Mfg. Co.
See ad on page 177.

CONSTRUCTION

254 Aluminum Building Sheet — Stressing advantages of aluminum for siding and roofing, 12-pp Form AD-247 presents both dimensional data and engineering details covering its use. Provides illustrated suggestions for use of fasteners, flashing details, directions for applying the sheet. Includes tips on painting, welding, storing. Aluminum Co. of America.
See ad on page 203.

256 Glass Block and Where to Use It—This 32-pp book gives design data, information on functional and decorative aspects of glass block. Covers properties, specifications, erection procedures. Insulux Div., American Structural Products Co.
See ad on page 167.

258 Building Panel Engineering Data—This 40-pp reference book for use of steel and aluminum panels for walls, decks and roofs, discusses their use, advantages, methods of installation. Covers acoustically treated panels, fire resistance ratings, electrification, acoustic roofs, reinforcing floor forms. Fenestra Building Products Co.
See ad on page 172.

260 To Nail It Right—Available for use with company's hardboards in plant construction work is the "Dial-It-Right, Nail-It-Right," a small cardboard reference wheel. The "Dial-It" side shows type and

BE PREPARED { *To increase production* / *To lower costs*

Photo courtesy Hamilton Mfg. Corp.

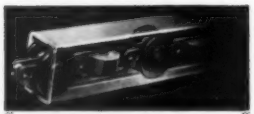
"Zig-Zag"® with R-W Continuous Power Conveyor

Are you prepared to get the maximum efficiency possible from your production line? Or are you face to face with a profit-eating handling bottleneck? Well, here's the answer to your problem—Richards-Wilcox ZIG-ZAG Continuous Power Conveyor.

ZIG-ZAG Continuous Power Conveyors are a patented and exclusive engineering achievement of Richards-Wilcox. You'll find them constantly at work in every type of industry —boosting production, lowering costs, solving man-power problems and raising production line efficiency.

ZIG-ZAG Conveyor Systems are remarkable for their versatility and adaptability. Their unique construction features make them quickly, easily and safely convertible to handling materials in almost any industry. Each unit is engineered to fit perfectly into existing layout and conditions.

Tremendous savings in manpower costs and time pay for the installation often in less than a year's time. See how you can bring bigger profits, maximum efficiency to your production line. Check up on R-W ZIG-ZAG Continuous Power Conveyors with your nearest dealer today.



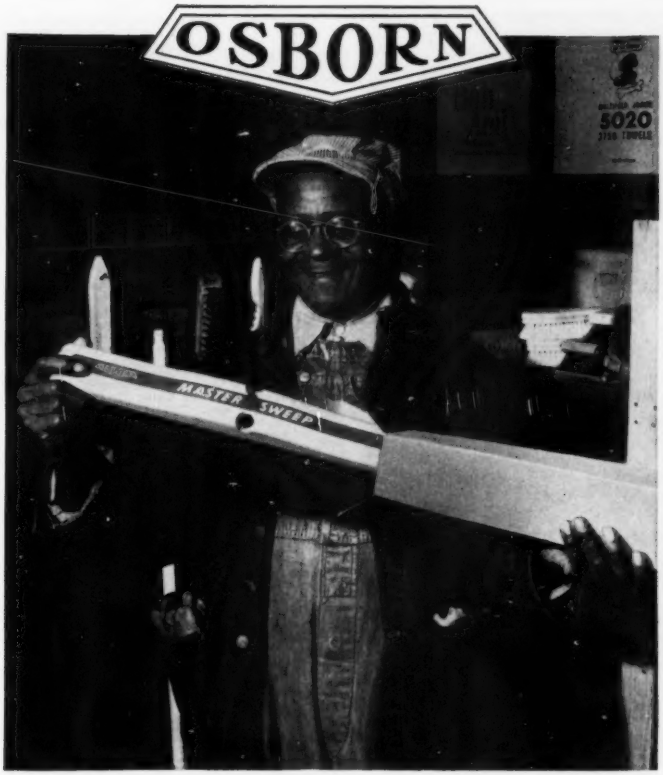
Engineered for Economy and Flexibility

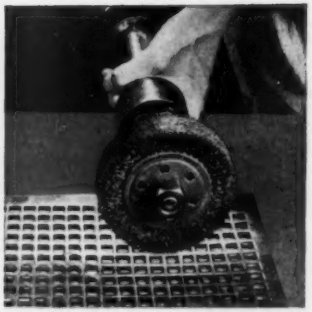
- Horizontal and vertical units alternate in a continuous chain traveling through special steel tubing.
- Complete flexibility for installation in any plant. Easily installed, easily changeable to conform to plant alterations.
- SAFE—all moving parts are fully enclosed.
- Low first costs. Low Power Factor.
- Standard horizontal or vertical curves —two-foot radius.

For complete details, or a prompt engineering consultation without any obligation, write our nearest office today.

Richards-Wilcox Mfg. Co.
"A HANGER FOR ANY DOOR THAT SLIDES"
AURORA, ILLINOIS, U.S.A. Branches in all principal cities
SLIDING DOOR HANGERS & TRACK • FIRE DOORS & FIXTURES • GARAGE DOORS & EQUIPMENT
INDUSTRIAL CONVEYORS & CRANES • SCHOOL WARDROBES & PARTITIONS
ELEVATOR DOOR OPERATING EQUIPMENT

1880 RICHARDS WILCOX R-W AURORA 1952
Reg. U. S. Pat. Off.
OVER 72 YEARS





THE WORLD'S FAVORITE general purpose power brush is the OSBORN Master® Wheel Brush. This dense, wide-face brush cuts fast and lasts a long, long time on all kinds of work such as removing scale, rust, grit, old paint . . . deburring parts . . . preparing surfaces for welding.

HOW TO TELL QUALITY in a paint brush: Simply look for the name "OSBORN"—recognized everywhere for quality workmanship and materials!

Specify "OSBORN" . . . you know it's good

YOU take no chances when you specify leading brands. They've *got* to be good...top quality merchandise...dependable service.

You are sure to get the best in workmanship and materials when you specify OSBORN industrial brushes, for they are backed by 60 years of service to industry.

And it's simple to buy Osborn brushes. Just order them automatically from your Industrial Distributor along with other mill supplies. Write for handy pocket catalog. *The Osborn Manufacturing Company, Dept. 716, 5401 Hamilton Avenue, Cleveland 14, Ohio.*

BUILT FOR INDUSTRY by the company that knows Industry's problems, OSBORN maintenance brushes clean more thoroughly and save valuable time.
Top: Osborn No. 93 Window Brush. Center: Osborn No. 656 Master® Duster; Below: Osborn No. 1820 Upright Fibre Broom.
®Trade Mark

Osborn Brushes

OSBORN POWER, MAINTENANCE AND PAINT BRUSHES AND FOUNDRY MOLDING MACHINES

Management and workers agree

DUSTUBE®

DUST COLLECTION

is a ***NECESSITY*** *for profitable operation*

at the Socony Paint Products Co., Metuchen, New Jersey

A complete Dustube Collector system ventilates all paint pigment grinding and mixing operations in the new plant of Socony Paint Products Co., large producers of industrial and marine paint products. Without the Dustube, with its virtually 100% collection efficiency, the dust in the mill loading room would be intolerable, forcing workers to wear respirators.

"The Dustube has made our operations so much healthier and cleaner," says G. J. Wrasman, Production Manager, "that it is indispensable from the standpoint of improved working conditions" An improved purity of color in the finished paints has also resulted since contamination of one mixer by the dust of another is eliminated.

The high efficiency and low operating cost of the Dustube is improving working conditions and saving money for manufacturers in all types of industry. Whenever you have a dust problem, it will pay you to investigate the cost-saving advantages of the Dustube.

Send for full details today.

American dustube® COLLECTORS

WHEELABRATOR & EQUIPMENT CORP.

839 S. Byrkit St. **Mishawaka, Indiana**

thickness of hardboard for exterior and interior walls, ceilings, underlayment wainscots, bench tops, doors and other uses. Reverse side gives nailing instruction. Masonite Corp.
See ad on page 191 for information on hardboards.

ELECTRICAL

262 Motor Control—A handy reference book on modern motor controls, comprises 76 pp of condensed information, dimensions and prices of the most popular items in company's line. Covers a-c manual and magnetic across-the-line switches; a-c voltage starters, control relays and contractors; synchronous and high voltage starters; d-c control relays, contractors, starters; drum switches, a-c d-c rheostats, speed regulators; push buttons, limit switches, and accessories. Allen-Bradley Co.
See ad on page 171.

264 Buyers' Manual on Motors and Control—Fifty-pp Catalog GEC-1009 presents buying information on a carefully selected group of motors, motor starters, control accessories and electronic control. Ratings listed are those most frequently required. Excellent selection data, dimensions, ratings and prices. General Electric Co.
See ad on page 55 for information on maintenance program.

266 Power Drives on the Job—In this 8-pp bulletin are more than 70 photos illustrating use of manufacturer's electric power drives in a wide range of industrial applications. Sterling Electric Motors, Inc.
See ad on page 125.

268 Power and Control Cables—Sixty-pp Catalog 24 describes typical power and control cable designs and is intended as a guide in selecting proper wire and cable type. Describes insulations, sheaths and coverings, electrostatic shielding, and includes product data on all types listed. Gives standard reel sizes and capacities, standard specifications. Rome Cable Corp.
See ad on page 61.

270 Circuit Breaker Reference Data — Catalog Section 5000 is a collection of more than 30 data sheets providing selection and application information and ordering instructions for company's molded case circuit breakers. Fully illustrated, includes ratings, current carrying capacities, dimensions, prices. I-T-E Circuit Breaker Co.
See ad on page 113.

271 Retractile Cords—Bulletin KKG describes and pictures some of the applications for permanently coiled, neoprene jacketed electric cords which expand to 5 times retracted length. Koiled Kords, Inc.
See ad on page 166.

272 Distribution Duct Engineering Data —Bulletin 427-4 contains 32 pp of data for estimating ventilated duct for feeder circuits, plug-in duct, and plug-in duct for branch circuits. Includes instructions for laying out distribution duct jobs, and pointers on estimating, diagrams, layout symbols. BullDog Electric Products Co.
See ad on page 183.

273 Plug-In Power — Sixty-pp Catalog 25 offers real help on electrical installation problems involving portable tools, materials handling equipment, cranes, hoists, cutting equipment. Covers a prefabricated trolley busway electrical distribution system to provide outlets for power or light where needed. Feedrail Corp.
See ad on page 67.

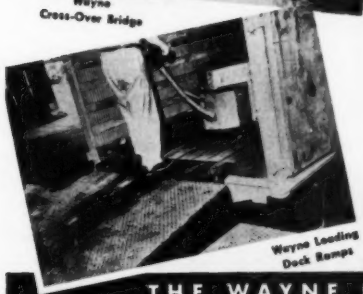
274 Bus Duct Manual—Booklet B-4272A, 68 pp, on bus duct and accessories, presents application and test data, specifica-

Two postage-free cards make it easy for you to order this literature. They're on pages 35-36 and 173-174.

GIVE YOUR PRODUCTION A Wayne LIFT

Wayne Materials Lift

Wayne Cross-Over Bridge



Wayne Loading Dock Ramps

Cut Handling Costs . . . Speed Shipments . . . Step-Up Production

From loading platform to production line there's a Wayne Industrial Lift to save you time, labor and money. Wayne Lifts include tilting dock, ramps, sidewalk elevators, dock lifts, materials lifts, crossover bridges, truck service lifts and many others. Everyone is custom engineered to the particular needs of your plant. Designed and built to help you safely move materials faster and at lower cost.

Wayne Industrial Lifts are "precisioneered" in construction. Made to last for years without trouble . . . designed for easy servicing. Wayne Engineers are materials handling experts . . . skilled in designing Wayne Lift Systems for improved production in your plant. Write today for the new Wayne Booklet on Industrial Lifts.

LIFT DIVISION
IRONTON, OHIO

Wayne

THE WAYNE PUMP COMPANY
SALISBURY, MARYLAND

tions, information on pricing a typical installation. Describes advantages of bus duct for a secondary power distribution system, carrying current from transformers to switchgear—and from there to motors, lighting systems, etc. Tells where bus duct can be used to advantage. Company's line of bus duct is shown and dimensions given. Westinghouse Electric Corp.
See ad on page 109.

275 Power Distribution Feeders — Catalog TEB-1, 40 pp, on heavy-duty units for main feeders in distribution system, gives construction, engineering, application data. Trumbull Dept., General Electric Co.
See ad on page 45 for information on panelboards.

LIGHTING

277 Selection Data on Lighting Fixture Hangers—Catalog 50, 80 pp contains general and detailed information on disconnecting and lowering lighting fixture hangers, accessories, special devices and parts. Utilizes 247 photos and drawings to show construction principles, operating features, installations, modifications and component parts for both indoor and outdoor units. The Thompson Electric Co.
See ad on page 150.

279 Series Sequence Ballast — Bulletin 551-11 announces a new series sequence 430 ma ballast for series operation of two 96T12 fluorescent lamps. Illustrates ballast, includes weight, dimensions, wiring diagram. Jefferson Electric Co.
See ad on page 161 for information on dual element fuses.

280 Precision Lamps—Bulletin 40 offers application and purchasing information on various types of lamps carried by manufacturer. Flood, infra-red, spatterproof, and weatherproof lamps are briefly discussed. Radiant Lamp Corp.
See page 190 for information on floodlamps.

COLUMN SHOWERS
(FOR GROUP USE)
AT
LOW COST
REQUIRE ONLY 3 PLUMBING CONNECTIONS

• Here's the answer to your Shower requirements at low cost.

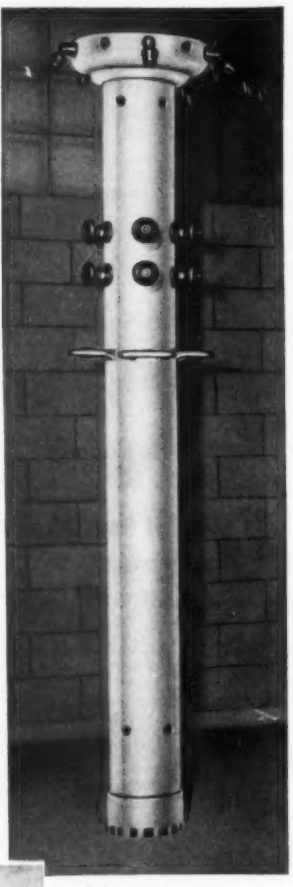
Without the usual partitions of the 3-stall or 5-stall Bradley Showers, the Column Showers are otherwise complete with drain fittings, sprayheads, soap trays, mixing chamber for temperature control with hot and cold water control valves. Ready to install.

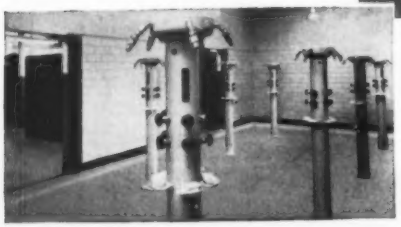
Floor space is saved and by placing Showers away from walls, wall waterproofing is not required and space may be used for lockers and benches.

Ideal for Factories, Mines, Camps, Schools, Field Houses, Institutions.

BRADLEY WASHFOUNTAIN CO.
2371 W. Michigan St., Milwaukee 1, Wisconsin

BRADLEY Showers
Distributed through Plumbing Wholesalers





Left: Installation of 8 Bradley Column Showers,—Cincinnati Chemical Co.

Write for Catalog 4701-CS

FUEL OILS, LUBRICANTS

281 The Why, What and How of Lubricants—This 20-pp booklet explains and illustrates common tests and terms describing lubricants. Covers viscosity, flash and fire, neutralization, number, penetration, specific gravity, extreme pressure, steam emulsion, corrosion. Tide Water Associated Oil Co.
See ad on page 65.

282 Lubricant Data Book—This pocket-size 56-pp booklet gives product information and principal uses of approximately 40 lubricants of both grease and fluid types, and general directions for proper application. Discusses lubricants requirements of equipment in 25 major industries. Lubriplate Div., Fiske Bros. Refining Co.
See ad on page 32.

283 Lubricant Additive—This pamphlet describes a colloidal graphite dispersion in oil for blending with petroleum products, to use in lubricating internal combustion engines, industrial machinery; a concentrated dispersion of colloidal graphite in mineral spirits for use in high temperature lubrication. Acheson Colloids Corp.
See ad on page 177.

284 Viscosity of Fluids—The larger significance of viscosity is discussed in Nos. 5 and 6, Vol. 36 of Lubrication, a technical publication. Illustrates simplest conception of streamline flow between two surfaces having relative motion. Shows how viscosity is measured. The Texas Co.
See ad on inside front cover for information on lubrication engineering service.

285 Cooperative Technical Consultation Service—This 24-pp booklet presents company's periodic consultation service offered to industrial plants and aimed at efficient use of petroleum products. Covers services available in solution of lubrication problems, metalworking operations, processing, fuel and heating oils, dust control. Gulf Oil Corp., Gulf Refining Co.
See ad on page 13.

286 Lithium Soap Greases — Twelve-pp Booklet AD 3084, on manufacturer's Stanolith greases, explains how they withstand both high temperatures and wet operating conditions. Discusses two grades—one recommended for central dispensing systems, and a heavier grade for compression cups or pressure gun. Standard Oil Co. (Ind.)
See ad on page 51.

PUMPS AND PUMPING

287 Centrifugal Pump Care—Sixteen-pp Bulletin 08X6256A is a handbook on the care of all makes of centrifugal pumps. Tells how to figure head, determine friction loss. Discusses causes of troubles and their cures, includes maintenance time table. Tells how to prevent cavitation, common mistakes in packing stuffing boxes. Allis-Chalmers Mfg. Co.
See ad on page 18 for information on double-suction pumps.

288 Centrifugal Pumps — Described and illustrated in Bulletin 50-9900 are a cross section of an extensive line of centrifugal pumps. Includes heavy-duty Bilt-on pump, a pneumatic sponge pump, deep well and submersible pumps. Byron-Jackson Co.
See ad on page 149.

289 Rotary Pumps — Bulletin WQ-50, 8 pp, describes Warren-Quimby Rotex pumps, illustrating design features by both sectional and exterior views. Engineering data, selection charts and dimensions are included. Warren Steam Pump Co., Inc.
See ad on page 189 for information on other pumps.

290 Centrifugal Pumps — Single- and two-stage pumps for small boiler feed service, cooling tower service, bottle washing, brine circulation, general water service, hot well service are described in Bulletin W-306-B1. Includes ratings. Worthington Corp.
See ad on page 66 for information on rotary pumps.

291 Rotary Pump Service Manual — Although written for users of company's

Among the things you take for granted...

The strong conviction instrument users hold for *measurements by* WESTON has its foundation in their own instrument experience . . . years during which WESTON instruments have given unfailing service . . . proved beyond doubt their unequalled precision, stamina and dependability. It is evident in the widespread preference shown for WESTON instruments for panel and built-in needs . . . where *so much* depends on the movement of a pointer. Regardless of the service . . . or the type, range or sensitivity of the instrument . . . truthful measurements and long, carefree service are *taken for granted.* Copy of panel instrument bulletin A7C gladly sent on request. WESTON Electrical Instrument Corporation, 617 Frelinghuysen Avenue, Newark 5, New Jersey . . . manufacturers of Weston and TAGliabue instruments.

WESTON *Instruments*

9360

Mechanized Maintenance*
—saved this roof!

Saved labor, time and dollars for its owner

*** A MECHANIZED GRAVEL REMOVER,**

operated by one man, loosened the gravel and exposed the clean roof mat of the Old Goff Mills building in Pawtucket, R.I.... as fast as six men could do the job by hand spudding. Dry spots and cracks were readily accessible—easily repaired.

*** A MECHANIZED ROOFING PUMP**

delivered Tremco Roofing Preservatives from the ground, 65 feet up the side of the building, right to the dry felts. Resaturation was speedily accomplished ...with no spillage...with one man doing the work of four.

THE TREMCO MAN recommended these Mechanized Maintenance methods after careful examination of this roof. Result: a revitalized roof that will give years of low maintenance service. And the job was done with substantial savings in time and labor! Write for 32-page booklet, "Solving Roof Problems". The Tremco Manufacturing Company, Cleveland, Ohio, or The Tremco Manufacturing Company (Canada) Ltd., Toronto.

TREMCO

PRODUCTS AND METHODS FOR BUILDING MAINTENANCE

(UM-1017)

own rotary pumps and including a parts list, this little 20-pp booklet contains tips on installation and care applicable to practically all pumps of this type. Covers mounting, pipe connections, suction lines, pipe sizes, strainers, discharge lines, power, relief valves, speeds. Provides pointers on noisy operation, rapid wear, decreased capacity, loss of suction. Viking Pump Co. *See ad on page 198.*

292 For Abusive Pumping Jobs—Catalog 4906, 36 pp, covers centrifugal pumps for wide industrial use and especially adapted to handling ashes, abrasive mixtures, slurries, hot and corrosive liquids. It describes several basic types; a horizontal shaft, single-stage side suction pump; a horizontal shaft, single-stage, rear-entrance automatic priming pump; vertical shaft pumps with standard, overhead and quill bearings for wet pit use. Nagle Pumps. *See ad on page 196 for information on other pumps.*

293 How to Solve Pumping Problems—Form 3060 is a 130-pp manual on selection, use of pumps. Tells type of pump construction best suited for handling 150 liquids. Explains how to determine size, compute suction list and discharge head, determine direction of rotation and size of speed of pulleys or gears. Gives instructions for installing rotary pumps, locating trouble. Geo. D. Roper Corp. *See ad on page 144.*

PACKINGS, GASKETS

295 Metallic Packing—This folder is devoted to company's elastic metallic packing intended for frictionless operation by means of an oil seal. Photos and text tell how seal is constructed, operates and is used. A. W. Chesterton Co. *See ad on page 156 for information on belt dressing.*

296 Long Wearing Piston Packing — Form 4502, 8 pp, presents composition cups for packing pistons of air and hydraulic cylinders and reciprocating pumps. Engineering information covers properties, textures, temperature and pressure data, sizes. Darling Valve & Mfg. Co. *See ad on page 169 for information on rubber-lined valves.*

298 Industrial Gaskets — This recently published 50-pp catalog covers an extensive line of gaskets and teflon products, including practically all types of metal, metal-asbestos and special gaskets as well as teflon packing and expansion joints and teflon stock. Includes both engineering and ordering data, application and installation tips. United States Gasket Co. *See ad on page 40.*

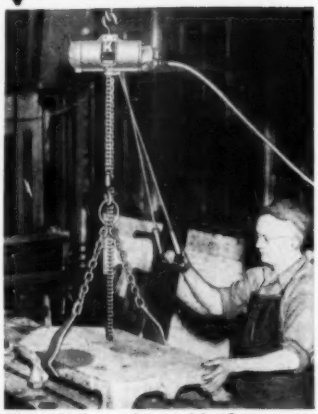
REFRACTORIES, INSULATION

300 Rugged Refractories—Form 5120 is a 12-pp illustrated booklet explaining characteristics of several high quality refractories and telling what each is best suited for. Not an ordering book, covers silicon carbide types, electric furnace mullites, electrically fused alumina refractories and fused cast refractories, discussing their heat resistance, heat conductivity, chemical inertness, resistance to abrasion, spalling, thermal shock. The Carborundum Co. *See ad on pages 104-105.*

302 Heat Insulation—This 8-pp booklet on hydrous calcium silicate insulation is illustrated with graphs, tables and drawings showing numerous ways this insulation is used in industrial and commercial projects for temperatures up to 1200 F. Lists the wide selection of shapes and sizes available to insulate tubes and pipes from ¼ to 72 in. dia and vessels from 72 in. to 60 ft, also flat surfaces. Also gives data on physical characteristics, thicknesses. Kaylo Div., Owens-Illinois Glass Co. *See ad on page 39.*

303 Fiberglas Bibliography—This is the new, 88-pp third edition of a volume of annotated references to selected articles on Fiberglas products which have appeared in the nation's press. Uses of Fiberglas products documented in the book include such applications as refrigerating equipment, water heaters, forced warm air furnaces, reinforced cable, storage batteries. Owens-Corning Fiberglas Corp. *See ad on page 134.*

for portability



Keller Hoist used to position heavy parts on a planer table.

KELLER air hoist

Here is a pneumatic hoist so light in weight (30 lb*), so small and easy to carry that one man can move it easily from job to job. It packs a wallop, too—lifts loads up to 1,000 lb at any speed from a creep to 17 fpm.*

It is small and compact—5" x 5" x 15"* . . . and so simple in construction that you will find maintenance costs are considerably lower. Descriptive literature will be mailed on request.

**Specifications given are for 1,000 lb Hoist; 300 and 2,000 lb capacities also available.*

KELLER

Pneumatic Tools

KELLER TOOL CO., GRAND HAVEN, MICH.

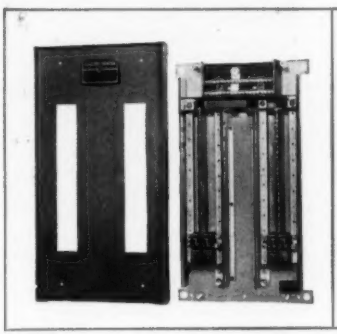
Now, get immediate local delivery on BullDog Panelboards up to 42 circuits

Just 5 *standardized* Electri-Centers now make up 2 complete lines . . . bring you more flexible panels at savings in time, money!

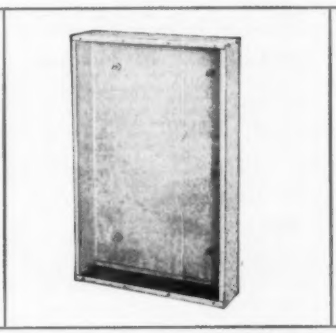
Now, BullDog has standardized panelboards. Just 5 catalog numbers fill every panelboard requirement up to 42 circuits; let you get immediate, over-the-counter delivery from local supplier's stocks on an item that once had to be specially ordered, custom-built and took weeks to get.

BullDog Electri-Center Panelboards save you money, too. They are mass-produced, cost less, offer you famous Pushmatic push-button switching and automatic circuit protection, *plus* complete flexibility to meet your changing electrical requirements.

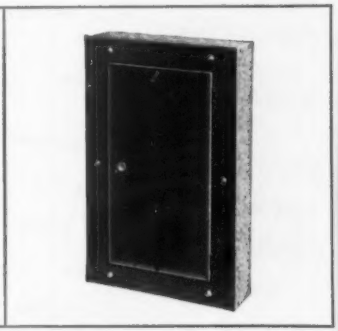
See your local BullDog supplier about these 2 complete, simplified panelboard lines . . . or write BullDog for detailed Bulletin No. 513. Underwriters'-approved. Meet Federal specifications WP 131a Class A.



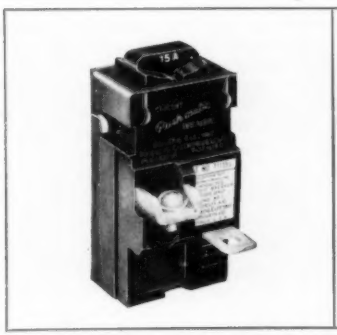
1 INTERIOR: Your local BullDog supplier now stocks 5 flexible interiors that will fill any panelboard need up to 42 circuits.



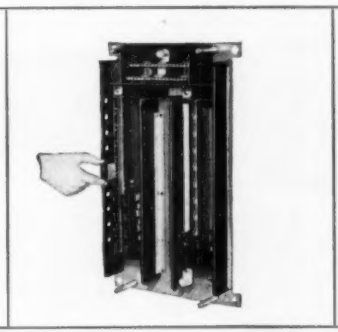
2 BOX: A Code Gauge steel box with ample knockouts is supplied to accommodate each single-phase or 3-phase 4-wire interior.



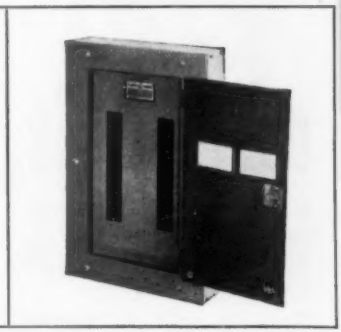
3 FRONT: Attractive gray fronts that include door (with locks) and trim also supplied on the spot. Either flush or surface type available.



4 PUSHMATICS: You select fully interchangeable Pushmatic circuit breakers according to number desired and ratings needed.



5 FLEXIBLE: Then, insert Pushmatics. Filler plates may be used in spaces where you'll want to add circuits later.



6 COMPLETE: And here is your complete BullDog Panelboard! Delivered and assembled in minutes right to your *exact* specifications.

Write for Descriptive Bulletin No. 513

BULLDOG

BULLDOG ELECTRIC PRODUCTS COMPANY

DETROIT 32, MICHIGAN • FIELD OFFICES IN ALL PRINCIPAL CITIES

IN CANADA: BULLDOG ELECTRIC PRODUCTS OF CANADA, LTD., TORONTO

PIONEERS IN FLEXIBLE ELECTRICAL DISTRIBUTION SYSTEMS

CHEMICALS in Quebec
ALFALFA in Alberta
BENTONITE in Wyoming, South Dakota
CEMENT in Kansas, Oklahoma
WOOD FLOUR in Maine
CHEMICALS in New Jersey, Pennslyvania
TOBACCO in Virginia, Kentucky
GRANITE in North Carolina
CHEMICALS in California
CARBON BLACK in Texas
SUGAR in Georgia
OYSTER SHELL in Florida

—just a few representative dusts collected in thousands of

SLY

DUST FILTERS

- Sly pioneered and leads in industrial dust control.

Sly representatives are trained and experienced engineers.

Your dust problem, large or small, can be solved by a Sly dust expert.

THE W. W. SLY MANUFACTURING CO.

4600 Train Avenue • Cleveland 2, Ohio

New York • Chicago • Philadelphia • Syracuse
Detroit • Buffalo • Cincinnati • St. Louis
Indianapolis • Birmingham • Los Angeles
Toronto

VALVES, TRAPS, PIPING AND ACCESSORIES

304 Reducing Valve Engineering Data—Bulletin 962 explains how the contour of a pressure reducing valve contributes to efficiency of performance. Discusses straight-line flow, tight closing. A. W. Cash Co. *See ad on page 12 for information on other reducing valves.*

305 Iron Body Gate Valves—Bulletin 805, 8 pp, covers company's popular iron body, bronze trim gate valves in both outside screw and yoke and non-rising stem types, telling best applications for each. Design features explained. The Ohio Injector Co. *See ad on page 7.*

306 Solder Joint Valve — Bulletin 103 describes a 100-lb valve for use with copper tubing. Gives working pressures, temperatures. Tells how to install a solder joint valve. The Kennedy Valve Mfg. Co. *See ad on page 158 for information on bronze gate valves.*

307 Valve Maintenance Guide — "Prevent Valve Failure Before It Starts," is a 28-pp text on valve selection, installation, inspection. Pictures damaged valves, explains how damage could have been prevented. Discusses maintenance schedules, inspection jobs, lubrication, pipe line checking, threading, regrinding, disc replacement. Jenkins Bros. *See ad on page 129 for information on connections for refrigeration compressors.*

308 Pressure-Vacuum Vent Valves — Bulletin E-601, 24 pp, is devoted to combination pressure-vacuum vent valves, stressing their low upkeep costs, positive shut-off, automatic operation and other features. Two types are presented — a standard assembly, and one with flame arrester element especially suited for use on storage tanks containing flammable materials. Booklet gives operational data, flow charts. Black, Sivalls & Bryson, Inc. *See ad on page 133.*

309 Automatic Valves — Pressure, flow, and liquid level controls for steam, air, gas and fluids are shown in 90-pp Catalog A-50. Includes sizes, prices, capacity charts, conversion tables. Davis Regulator Co. *See ad on page 192 for information on strainers.*

310 How to Install, Maintain Traps — Form 1722 is an 8-pp illustrated instruction folder covering use of company's traps. Installation section covers location of traps, hookups, bypasses, use of strainers, other factors to be considered. A chapter on trouble shooting includes discussion of common troubles as well as mysterious ones. Armstrong Machine Works. *See ad on page 5.*

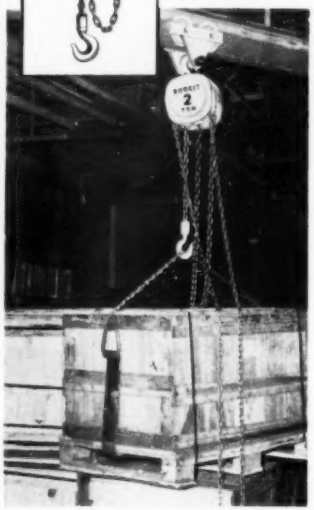
311 Steam Trap Reference Manual—Bulletin T-1740, 24 pp, tells why and where steam traps should be used; explains desirable trap features. Advantages of company's impulse steam traps are described, their operation illustrated. How to figure traps sizes and how to size condensate return lines are told and capacity and pipe dimension charts and thermodynamic properties of saturated steam included. Yarnall-Waring Co. *See ad on page 68.*

312 Steam Hook-ups—This 64-pp manual on hook-ups for steam traps, air vents and temperature controls provides diagrams, size calculators, selection data on traps and regulators, properties of saturated steam, dimensions. Sarco Co., Inc. *See ad on page 121 for information on plating controls.*

314 Steam, Air and Gasoline Traps — Catalog 751, 32 pp, is a recently issued trap ordering book with capacity tables, installation diagrams, and containing charts and formulas for determining proper size trap for specific applications. Covers thermostatic steam traps, expansion steam traps, weight-operated traps for steam, air, gasoline, pressures up to 1500 lb; separators. W. H. Nicholson & Co. *See ad on page 27.*

315 Design Properties of Pipe—This 12-pp booklet consists of tables listing pipe

MOVE INTO SPEED LIFTING



Every spot-lifting job is a job the 'Budgit' Aluminum Chain Block can handle faster and better. It's a knockabout hoist — a light, portable hoist anyone can carry, hang up by himself, and operate. The ¼-ton size weighs a mere 29 pounds. You can lift the full load with a 25-lb. pull on the hand chain. Other available capacities are: 1,000, 2,000, and 4,000 lbs.

Learn why the 'Budgit' Aluminum Chain Block can't be matched by any other manually operated chain block in speed, ease of use, safety, durability, economy by reading Bulletin No. 398. Write for a copy.

'BUDGIT' I-BEAM TROLLEYS —

enable your chain blocks to travel the load as well as lift it. Made of tough steel. Adjustable to fit various I-Beam sizes. Ball bearing equipped. Capacities: 500 to 4,000 lbs. Priced from $13.50 Write for Bulletin No 390.

MAXWELL MANNING MOORE MUSKEGON MICH. TRADE MARK

'Budgit'®

CHAIN BLOCKS

MANNING, MAXWELL & MOORE, INC.
MUSKEGON, MICHIGAN

Builders of "Shaw-Box" Cranes, 'Budgit' and 'Load Lifter' Hoists and other lifting specialties. Makers of 'Ashcroft' Gauges, 'Hancock' Valves, 'Consolidated' Safety and Relief Valves, and 'American' Industrial Instruments.

Walworth manufactures a complete line of Gate, Globe, Angle, Check, and Lubricated Plug Valves, made of Stainless Steel, Steel, Iron, Bronze, and Special Alloys in a wide range of sizes and temperature-pressure ratings.

Fittings of steel, iron, and bronze are also manufactured in all conventional types and sizes.

WALWORTH

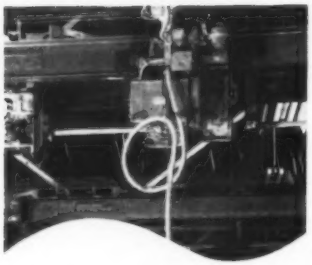
valves and fittings

60 East 42nd Street, New York 17, N. Y.

Distributors in principal centers throughout the world

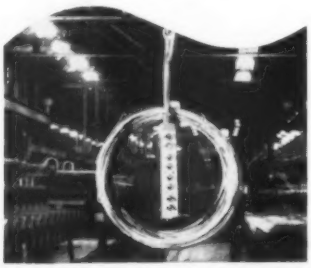
MATERIALS *Handling* IDEAS

Push-Button War Against High Costs



● This plant transformed a slow, costly handling job into a simple, push-button operation. The job was to remove wire from winding drums and convey it to the next operation. To reduce handling costs, a new idea was tried: a ½-ton, single I-Beam *Reading* Electric Crane was custom-built for the job. *All* motions were motorized. Now one man controls the entire operation faster and more economically—by simply pushing the right button.

If you believe that *modern* materials handling can reduce costs in your plant, get in touch with *Reading*. At no obligation, a *Reading* Engineer will personally analyze your handling operations. A note on your letterhead will put him to work.



READING CRANE & HOIST CORPORATION
2103 ADAMS ST., READING, PA.

CHAIN HOISTS • ELECTRIC HOISTS
OVERHEAD TRAVELING CRANES

READING CRANES

sizes and wall thicknesses currently established as standard, plus what is believed to be the most nearly complete tabulation ever published of dimensional properties of commercial steel pipe. Tube Turns, Inc. *See ad on pages 18a-18b.*

316 Piping Pointers—This is company's popular piping manual covering fundamentals of sound piping practices. Discusses various types of valve designs and how each should be used. Pictures and names more than 80 kinds of fittings and contains many illustrated how-to-do-it features. Included with the manual is an 8-pp valve selection guide. Crane Co. *See ad on page 123 for information on diaphragm valves.*

317 Manifold Discharge Piping Application—Manual 51-B, 34 pp proposes an approach to design of discharge header systems based on partial or complete elimination of back-pressure effects on tied-in safety-relief valves. This principle is claimed to offer great savings in cost of discharge piping. Farris Engineering Corp. *See ad on page 146.*

318 Strainers and Separators — Bulletin R-46-50A is a 16-pp catalog on T-type strainers, suction strainers, multi-flow and receiver separators. Contains dimensions, prices. American District Steam Co. *See ad on page 141 for information on expansion joints.*

319 Steel Unions — This catalog sheet describes and pictures several types of steel unions, telling applications of each and listing sizes, prices. Features an orifice union for flow control of steam, oil, ammonia, chemicals, water, gas, also metering applications. Clayton Mark & Co. *See ad on page 46.*

320 Unions and Fittings — Twelve-pp Catalog 50 covers manufacturer's line of unions of all types, elbows, tees and fittings. E. M. Dart Mfg. Co. *See ad on page 142.*

321 Threadless Bronze Fittings—A fitting designed to improve copper and brass piping is described in this illustrated bulletin. This is a threadless bronze fitting with brazing alloy (company's Sil-Fos) incorporated as a ring in the port openings. Stresses strength of joint. Walworth Co. *See ad on page 185 for information on valves.*

322 Flexible Hose, Bellows — Catalog CMH-123, NPH, 16 pp, describes and gives specifications for manufacturer's line of Flexon bellows and flexible metal hose. Information on metallic bellows of stainless steel, brass, bronze and other alloys is included, covering bellows used in many types of control, regulators and thermostatic devices. A selection guide is provided for steam traps, valves. Flexonics Corp. (formerly Chicago Metal Hose Corp.). *See ad on page 115.*

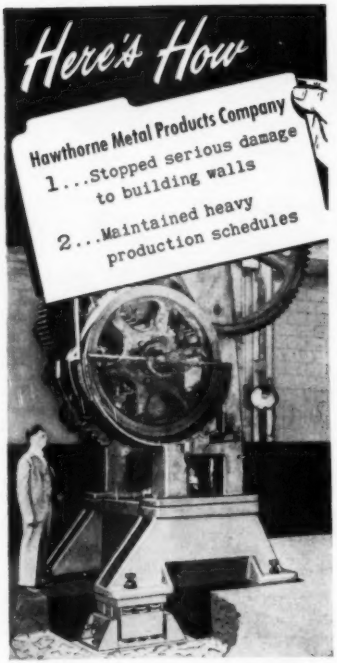
INSTRUMENTS, CONTROLS

325 Industrial Control Devices—Catalog 8303, 64 pp, presents 100 models of non-indicating electric, electronic, and pneumatic controllers for flow, pressure liquid level and humidity applications. New instruments shown include electronic temperature controllers. Brown Instruments Div., Minneapolis-Honeywell Regulator Co. *See ad on page 57.*

326 Handbook on Automatic Controls—Catalog 700 provides 45 pp of ordering and application data on automatic controls with mercury contact switches. Covers control equipment for temperature, pressure-low water, liquid level, bottles; transformer-relays, valves. The Mercoid Corp. *See ad on page 188.*

327 Electronic Control System—Bulletin A-701 introduces company's Autronic system, a miniature all-electronic system for controlling pressure, temperature, flow and level, intended for use in chemical processing plants, refineries, central stations, other applications where fast, accurate control is required. The Swartwout Co. *See ad on page 170 for information on ventilating louvers.*

329 Wide Range Regulator—Featured in Bulletin 316 is an expansion stem type


Here's How
Hawthorne Metal Products Company
1...Stopped serious damage to building walls
2...Maintained heavy production schedules

Huge 600 ton capacity press weighing 100,000# at Hawthorne Metal Products Company, Royal Oak, Michigan. Special 25,000# capacity Korfund Steel Spring Vibro-Isolators installed directly under the press weigh 600# each.

..by controlling shock

Shock from this big press was cracking building walls. To maintain heavy production schedules, this condition had to be remedied — fast.

Korfund's Detroit representative was called in, analyzed the problem, and 'phoned in the important data to the Korfund factory. Korfund engineers immediately started designing and building the special Isolators.

Seven days later, they were shipped!

This press has now been in daily operation for over a year, and shock transmission to the building has been completely eliminated. Yet the 100% effective Korfund Isolators cost less than 3% of the press cost.

For less critical installations, there are even less expensive standard stock Isolators. A Selector Chart in Bulletin G-104 gives recommendations for both normal and critical conditions. See Sweet's Catalog Files, or write us for your free copy today.

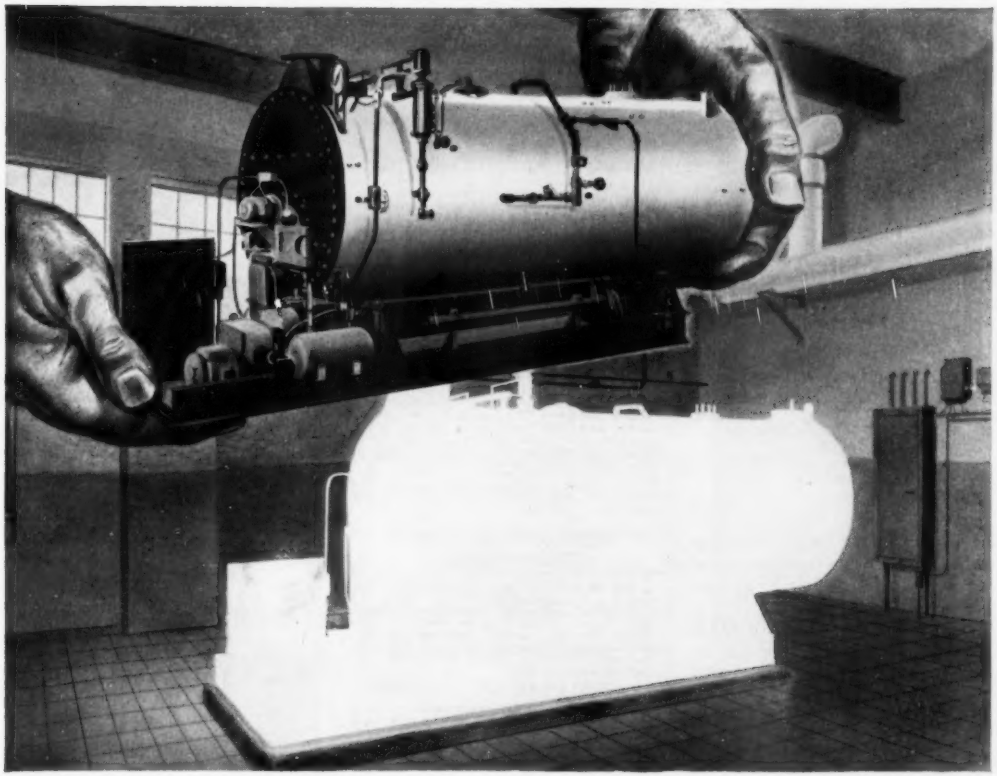
We'll gladly submit recommendations, without obligation. A half century of experience is at your disposal.

Representatives in Principal Cities

KORFUND VIBRATION CONTROL — SPRINGS — RUBBER — CORK

THE KORFUND COMPANY, INC.
48-35B Thirty Second Place • Long Island City 1, N. Y.

Ready when you need it...



Save Installation-Construction Time — Expedite Emergency Installations — Serve Immediate Temporary Steam Needs — With a Cleaver-Brooks Self-Contained Boiler

WHEN speed is vital, you can save weeks of valuable installation time with a Cleaver-Brooks boiler — delivered to location as a complete, factory assembled and tested, self-contained unit, with much of the trim and accessories provided.

In an emergency the installation time can be reduced to as little as 48 hours, by following a properly planned and coordinated procedure of providing in advance the required facilities — foundations, headers, service and blow-off lines, fuel tanks and lines.

Prior to the completion of your building, Cleaver-Brooks boilers can be placed in operation to serve immediate steam needs. When permanently installed the change-over takes place with a minimum of labor and expense and the avoidance of interrupted steam service.

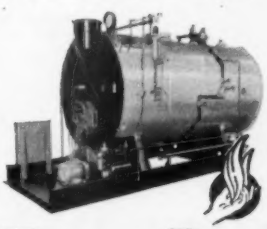
Cleaver-Brooks are the first and finest in modern, self-contained boilers — operate at a guaranteed efficiency of 80% — burn the fuel most available and economical in your area, gas, oil, or combination gas and oil — fully meet all codes — standard models available in sizes 15 to 500 hp; 15 to 250 psi.

CLEAVER-BROOKS COMPANY
Originators of the Self-Contained Boiler
Dept. F, 308 E. Keefe Ave., Milwaukee 12, Wis., U.S.A.
Cable Address: Clebro-Milwaukeewis

Write for latest, fully illustrated and descriptive Cleaver-Brooks Steam Boiler Catalog.

WHY INSTALLATION TIME IS CUT:

- Simple Low-Cost Stack
- No Job-Site Brickwork — No Special Foundations
- Boiler Delivered as a Complete, Factory Assembled, Tested, Self-Contained Unit
- Centralized Responsibility — No Waiting on Multiple Sources of Supply



Cleaver-Brooks

Builders of Equipment for the Generation and Utilization of Heat • Steam Boilers • Oil and Bitumen Tank-Car Heaters • Distillation Equipment • Oil and Gas-Fired Conversion Burners

BUILT FOR YEARS
OF HARD WORK AND ABUSE—

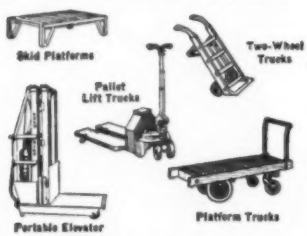
Weld-Bilt

HYDRAULIC
LIFT-TRUCK

Here is a hydraulic lift truck that can "take it and deliver" year in and year out, with hardly a thought to maintenance. It's Weld-Bilt.

One of the many reasons for Weld-Bilt's longer service life is the exclusive HORIZONTAL MOUNTING of the hydraulic unit. This vital unit is protected from danger of daily knocks and bumps. And this unit is interchangeable — it can be replaced after years of service to add still longer life and utility to the truck.

In their capacity range of 2,500 to 10,000 pounds, there's a Weld-Bilt Hydraulic Lift Truck to fit your needs exactly. Write for catalog, details or engineering consultation on the COMPLETE Weld-Bilt Line.



WEST BEND
EQUIPMENT CORP.
MATERIALS HANDLING
ENGINEERS
304 WATER STREET • WEST BEND, WIS.

temperature regulator operated by water or compressed air. Explains how regulator works. The Powers Regulator Co.
See ad on page 200.

330 For Spotting of Overhead Loads—Bulletin 921-A on magnetic crane controls for d-c cab-operated cranes lists standard features for crane-hoist service and bridge or trolley service. Explains time-current method of acceleration, operating principle of Wright dynamic lowering circuit controller. The Electric Controller & Mfg. Co.
See ad on page 132 for information on other automatic control applications.

332 Gages for Many Jobs—Sixty-eight pp of liberally illustrated information is offered in Catalog 64. Describes a variety of gage types; air volume controls for pump installations, vapor tension thermometers, d-c ammeters and voltmeters, and water flow meters covered. Includes engineering tables. United States Gauge Div., American Machine and Metals, Inc.
See ad on page 159 for information on thermometers.

333 Time Saving Volt-Ammeter—Manual 110, 16 pp, "How to Make Your Job Easier with the Amprobe," describes the handiness of this pocket-size volt-ammeter in installing, repairing, servicing electrical equipment. Pyramid Instrument Corp.
See ad on page 151.

334 Electrical Instruments—A line of instruments for production testing, plant maintenance and service is shown in 16-pp Bulletin A-16-B. Among these are a-c clamp volt ammeters and a-c clamp ammeters, circuit testers, analyzers, mutual conductance tubechecker, pocket-size meters. Weston Electrical Instrument Corp.
See ad on page 181.

MECHANICAL POWER TRANSMISSION

336 Manual on Power Transmission Machinery—Containing 225 pp of data, this illustrated handbook covers roller bearings, V-belt drives, friction clutches, couplings, collars, sleeve bearings, pulleys, take-ups and hangers. Provides engineering data, formulas. Dodge Mfg. Corp.
See ad on page 111.

337 Power Drive Handbook—Catalog 709, describing roller chains and sprockets, includes tips on selecting stock roller chains for every type of power drive service. Diamond Chain Co., Inc.
See ad on page 47.

339 Rough Top for Belts—Five designs of rough top surfaces which can be put on company's conveyor belts are pictured in Bulletin A-5148-E. Recommended applications for each design are discussed briefly. Goodyear Tire & Rubber Co.
See ad on back cover for information on steel cable V-belts.

340 Blocks and Sheaves—Catalog 300-24 24 pp, covers manufacturer's complete line of blocks and sheaves. Provides block number, capacity in tons, number of sheaves, rope size and weight of each block. Illustrations, ratio table included. American Hoist & Derrick Co.
See ad on page 162.

342 Belts to Suit the Job—This bulletin presents company's "inner-locked" woven duck belting available in types for general elevating and conveying and general power transmission applications as well as special jobs. Imperial Belting Co.
See ad on page 194.

MAGNETS

343 Magnetic Selection Guide—Twelve-pp illustrated Catalog C-5000-B, describing manufacturer's entire line of magnetic separators and lifting magnets serves as handy guide to the selection of magnets. Dings Magnetic Separator Co.
See ad on page 22.

344 Metal Detector — Catalog E-41 describes the RCA utility metal detector, a protective device for indicating the presence of metallic particles magnetic or non-

MERCOID

The Choice of Experienced Engineers

IT'S THE MERCURY SWITCH THAT DISTINGUISHES MERCOID FROM THE AVERAGE LINE OF CONTROLS

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IN ··· QUALITY
ACCURACY
DURABILITY
PERFORMANCE
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SAFETY FEATURES
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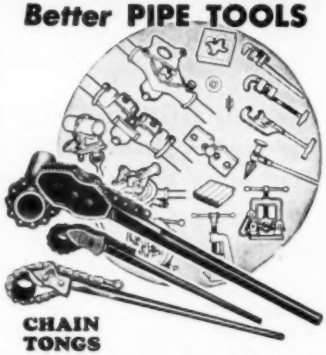
QUICK ADJUSTMENTS
SIMPLIFIED WIRING
UNFAILING SERVICE

Used on a variety of industrial applications involving the control of Temperature, Pressure, Liquid Level, Etc.

WRITE FOR CATALOG 700 — PLEASE MENTION THIS PUBLICATION

THE MERCOID CORPORATION
4201 BELMONT AVE. CHICAGO 41, ILL.

ARMSTRONG BROS.
Better PIPE TOOLS



CHAIN TONGS

"Reversible," "Standard" and "Ideal" types in all sizes. Jaws are drop forged from special steel, are carefully milled, heat treated hardened and tested. The Handles are forged spring steel. The Chains are proof-tested to ⅔ catalog strength (1,200 lb. to 40,000 lb.). "Reversible" Jaws give double jaw life. "Standard" Jaws have extra bearing on the handle and forged-in chain guides. The "Ideal" Tongs have V shaped teeth for a sure grip on irregular shapes—fittings, etc.

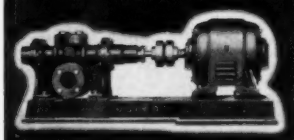
Write for Catalog

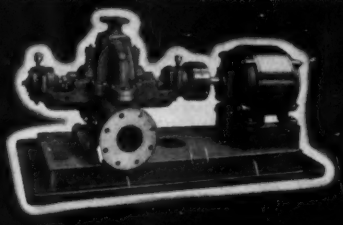
ARMSTRONG BROS. TOOL CO.
"The Tool Holder People"
5207 W ARMSTRONG AVENUE • CHICAGO 30, ILL.

WARREN...the most complete line of industrial pumps available from one source

CENTRIFUGAL • RECIPROCATING • SCREW • ROTARY

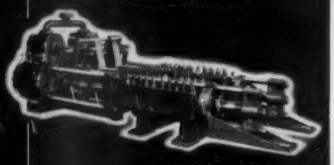
Warren-Quimby Gear-in head Screw Pump

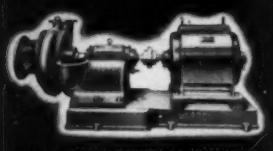




Warren Condensate Pump

Warren Horizontal Duplex Hydraulic Pump



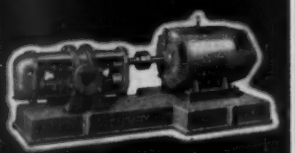


Warren Type "L" Single-Stage Single-Suction Liquor Pump

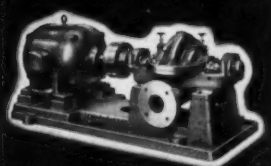
There's a Warren or Warren-Quimby Pump for practically all industrial pumping applications, and our large variety of types and sizes assures an unbiased recommendation. The value of this should not be underestimated because a recommendation that barely meets operating conditions and requirements can prove to be anything but a profitable long range investment, regardless of any initial advantage in cost.

It will pay you to check with Warren on your next pumping job.

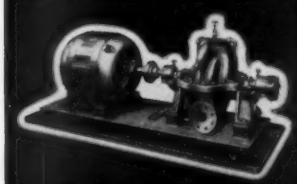
P-37



Warren-Quimby External Gear and Bearing Rotex Pump



Warren Type DBL, Single-Stage Double Suction, Centrifugal Pump



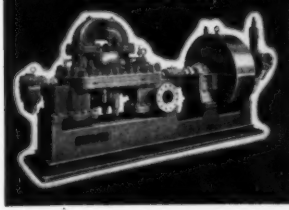
Warren Two-Stage Volute Centrifugal Pump

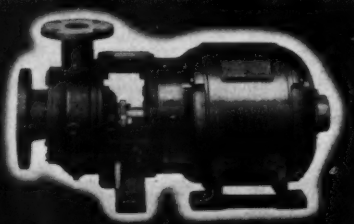
WARREN QUIMBY PUMPS

WARREN STEAM PUMP COMPANY, INC.

WARREN, MASSACHUSETTS

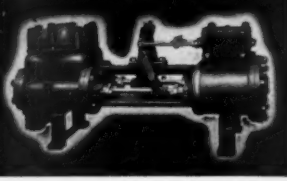
Warren 4- and 6-Stage Centrifugal Pumps





Warren "Compacunit"—4 Types—42 Sizes

Warren Horizontal "Realwear" Duplex Piston Pump



Portable HEAVY DUTY

P-S BAR RACKS

for quick convenient safe efficient storage

Item No. C-497

Handling and storage of steel shapes simplified for one-man operation. Using overhead crane for storage in tiers, rack selection is no problem. Design permits bar selection from any rack without disturbing tiers. Built to any capacity and length of stock.

Any rack easily accessible

Automatic Tong by HEPPENSTALL, Pittsburgh, Pa., for easy pick-up and safe carrying.

Easily placed on trucks for removal to machines not under crane.

When Ordering Always give "item" number; this will help prevent error. Write for catalog.

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Palmer-Shile Co.

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RADIANT HI-FLOOD

Reflector Weatherproof FLOODLAMPS

NICKEL PLATED BASE
SILVER REFLECTOR INSIDE STAYS BRIGHT ALWAYS
WEATHERPROOF HARD GLASS
MAXIMUM LIGHT OUTPUT · WIDE BEAM

Cost Less to INSTALL to MAINTAIN

INDOORS or OUTDOORS

No Dirt-catching Reflectors

200 to 1000 Watts

St'd. or High Voltage

Radiant Hi-Flood Floodlamps reduce industrial lighting costs many ways. They cost less to install, indoors or outdoors by eliminating need of heavy, expensive fixtures. High light output maintained throughout lamp life. Saves power. No fixtures to polish. Sealed-in silver reflector.

Radiant Technical Bulletin 80 gives full details. Send for it.

RADIANT LAMP CORPORATION, 300 Jelliff Avenue, Newark 8, N. J.

Manufacturers of Lamps for PROJECTION ● FLOODLIGHT ● SPOTLIGHT ● MOTION PICTURE PRODUCTION SOUND REPRODUCTION ● AERONAUTICAL ● SPORTS LIGHTING AND GENERAL SERVICE ● RECTIFIER BULBS

magnetic, in open or packaged nonmetallic materials. Eriez Mfg. Co.
See ad on page 127 for information on other magnets.

OTHER EQUIPMENT

345 Making Profits from Overhead—Use of overhead space for economical storage room is discussed in Bulletin 31, covering manufacturer's Loadmaster racks. Illustrates four basic types of racks, trucks and stacking units for loading racks. Lewis-Shepard Products, Inc.
See ad on page 41 for information on stacking trucks.

346 Axial Flow Blowers—In this 6-pp illustrated bulletin are described axial flow blowers of both turbine-driven and motor-driven types. Gives capacity and dimensional data, operating range and specifications on both types. L. J. Wing Mfg. Co.
See ad on page 199.

347 Washroom Layouts — Sixteen blueprint drawings of industrial and institutional washroom layouts are shown in this 12-pp booklet. Provides a general discussion of washroom planning, also roughing-in data. Bradley Washfountain Co.
See ad on page 180 for information on column showers.

348 How Much for Steam — Here's a "slide rule" calculator for computing steam costs. It's pocket-sized, and enables a plant engineer to find comparative steam costs per 1000 lb, using coal, oil or gas, and based on fuel costs of price per ton, gallon, cubic foot. Cleaver-Brooks Co.
See ad on page 187 for information on self-contained boilers.

349 Elevated Steel Tanks—Welded steel tanks with ellipsoidal bottoms and roofs are presented in this 24-pp booklet as an economical means of increasing plant water storage capacity, maintaining uniform pressure. Chicago Bridge & Iron Co.
See ad on page 152.

350 Dry Chemical Extinguishers — New quick-acting fire extinguishers of the dry chemical type in 20 and 30 lb sizes are covered in Form C-104. C-O-TWO Fire Equipment Co.
See ad on page 131.

351 Case Histories on Brushing Problems—The solutions to 12 industrial brushing problems are told in this 32-pp illustrated booklet. Shows how rotary wire brushes, specially selected or engineered for the job, are used to perform abrading, cleaning and finishing jobs. Brush Div., Pittsburgh Plate Glass Co.
See ad on page 201.

352 Plumbing and Heating Supplies—Edition F is a 118-pp catalog listing over 2500 repair parts and precision tools for maintenance of all types of plumbing fixtures. Fully illustrated, includes plumbing fixtures. J. A. Sexauer Mfg. Co., Inc.
See ad on page 4 for information on faucet washers.

353 Boiler Room Layouts—Now available to plant engineers concerned with new construction or remodeling are a set of blueprints of an ideal boiler room showing where equipment should be located. Includes floor plan. Canton Stoker Corp.
See ad on pages 16-17.

354 Heating, Air Conditioning Book—Bulletin PB-290, 36 pp, is a complete, condensed catalog covering company's full line of air conditioning, heating, ventilating and heat transfer equipment. Supplements some 40 specialized bulletins on various product lines. The Trane Co.
See ad on page 126 for information on unit heaters.

355 Hydrogen Zeolite Softeners — Publication 4530, 16 pp, presents hydrogen zeolite (cation exchange) water softening equipment. Gives a complete description of the process and the field of application, showing advantages. Cochrane Corp.
See ad on page 194.

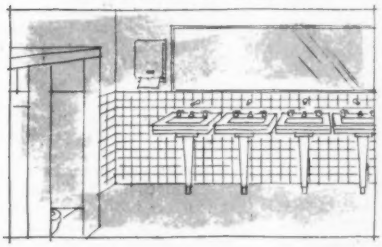
356 Good Place for Wraps — Manufacturer's Lockerettes, modern scientific locker units combining best features of both lockers and coat racks, are described and pictured in Bulletin 658. Vogel-Peterson Co.
See ad on page 196.

the case of the beautiful sourpuss

Mary Jones was the best looker in the plant. All the boys said so. A good worker, too. Her foreman said so. But she sure was unhappy about something. The "beautiful sourpuss" they called her.

But not any more. Ever since the company remodeled the "powder room," Mary Jones has been very happy. Friendly and helpful and full of smiles.

Does even better work, too.



All the other girls are happier, too. Their washroom is a much pleasanter, cheerier place, now that it has beautiful, gleaming walls of Masonite Temprtile® and Masonite Tempered Presdwood,® in glowing pastel shades. Gives them a greater feeling of self-respect. Shows them that their company is really interested in them.

Here's why remodeling with
MASONITE PRESDWOOD PRODUCTS
is a good investment

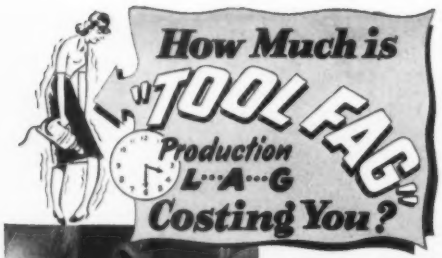
1. **Temprtile is scored in 4" squares to present neat tile pattern. Tempered Presdwood offers hard, smooth, strong surface. Both are economical to buy and use.**
2. **Large panels are 4 ft. wide, up to 12 ft. long.**
3. **They go up quickly over existing walls and ceilings.**
4. **Permanently cover cracks and other blemishes.**
5. **Easy to cut and fit with carpenters' tools.**
6. **Take attractive, permanent finishes in enamel or paint.**
7. **Sanitary. Easy to keep clean with minimum maintenance. Resist moisture.**
8. **Durable. Won't split, splinter or crack. Resist surface wear.**

Your local building materials dealer sells these grainless all-wood hardboard panels. For complete information, write—

MASONITE® CORPORATION
Dept. PE-5, Box 777, Chicago 90, Ill.

"Masonite" signifies that Masonite Corporation is the source of the product

BETTER HARDBOARDS FOR BETTER MAINTENANCE



Prevent this LOSS with

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Pneumatic Shop Tools

Turn out more work, easier, faster, with lightweight, vibrationless tools that reduce fatigue to an absolute maximum. Typical of Mall compactness and precision in pneumatic tools is this No. PG-K1030L Lever Throttle Die Grinder, weighing only ¾ of a pound and easily held in the palm of the hand. With a guaranteed speed of 30,000 rpm. and a maximum of .0015 runout at the collet, this Mall Pneumatic Die Grinder assures accuracy, precision and ease of operation.

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BASKET TYPE

STRAINERS

- Large Strainer Area!
- Low Pressure Drop!
- Easily Cleaned!

Davis Basket Type Strainers are used on pressure and suction pipe lines for the protection of meters, valves, pumps and other equipment. The No. 76 Strainer has a cylindrical basket with perforated sides and bottom supported at the top by a flange. When the cover is removed the basket may be lifted out easily for cleaning. Large body passage reduces pressure drop across the strainer to a minimum. The size of screen perforations depends on the fluid being strained and the foreign matter in suspension. Ask for recommendations.

DAVIS
No. 76
STRAINER
SIZES
½" to 14"

DAVIS REGULATOR CO.

2552 S. WASHTENAW AVENUE • CHICAGO 8, ILLINOIS

NEW BOOKS

for the plant engineer

Exhaust Hood Handbook

EXHAUST HOODS by J. M. DallaValle. Second edition; size 6 by 9 in.; illustrated; cloth bound; 146 pp including index. Published by The Industrial Press, 148 Lafayette St., New York 13, N. Y. Price $3.50.

ENLARGED FROM THE PAMPHLET FORM in which it was originally published, this second edition gives comprehensive information on the flow of air around and into the openings, hoods, or slots in exhaust ventilating systems.

The book is organized in chapters in accordance with hood types rather than specific applications. Chapters deal with various aspects of theory, including flow of gases, velocity characteristics, actual hood design and the essentials of hood construction.

The book is intended for plant engineers and others having problems requiring the use of local exhaust ventilation.

Secondary Raw Materials

INDUSTRIAL WASTES by Charles H. Lipsett. Size 6 by 9 in.; 317 pp; cloth bound. Published by Atlas Publishing Co., 425 W. 25th St., New York 1, N. Y. Price $5.00.

THIS BOOK offers a comprehensive analysis of all the important industrial wastes, dwelling on their origins, methods of handling and recovering, and final utilization in industry.

Accenting the non-technical approach, the author cites the importance of scrap to the national economy, and describes the various conversions of waste materials into useful commodities. Among the scrap sources discussed are included: plastic, glass, copper and brass, iron, leather, wood, rubber and others.

The book provides its readers with a general knowledge of the over-all picture of the production and utilization of waste materials.

Water Treatment

WATER TREATMENT for Industrial and Other Uses by Eskel Nordell. Size 6 by 9 in.; 526 pp including index; illustrated; cloth bound. Published by Reinhold Publishing Corp., 330 West 42nd St., New York 18, N. Y. Price $12.00.

THIS BOOK is a clear and thorough study of a much misinterpreted subject. It covers the different conditions of water resulting from the entrainment and solution of matter,

both solid and gaseous. Attention is given to the effect of untreated water on piping and other equipment. It also deals with the importance of water as a factor in the selection of a plant site.

A sizable portion of the book is devoted to fundamental information on sources of water supply, impurities, water requirements for industry, hospitals, municipalities and others. This leads the reader to the chapters on the specific processes of water treatment which are covered extensively.

Experts have termed this book a practical guide for executives, consultants, engineers, operating personnel, students and chemists.

Are Your Accounts in Order?

MAPI ACCOUNTING MANUAL. Size 8½ by 11 in.; 1209 pp printed on one side; cloth bound. Published by Machinery and Allied Products Institute, 120 S. La Salle St., Chicago 3, Illinois. Price $15.00.

How SHOULD you cost your products? Are your inventory pricing methods reflecting a true picture of your current operations? These and many other questions are answered in this revised accounting manual.

The purpose of the manual is to indicate, and in some cases illustrate, suitable accounting methods for dealing with any situation which may reasonably be expected to arise in the capital goods industries.

The ten sections of the manual cover such subjects as: Classification and description of accounts; Financial statements and reports; Property, plant and equipment; Manufacturing costs; Sales engineering and administrative expenses; Pensions; Internal control and auditing; Cost estimating and its uses; Profit planning and budgeting; and Recognition of changing value of the dollar.

Gaseous and Liquid Fuel Heat

NORTH AMERICAN COMBUSTION HANDBOOK. Size 6 by 9 in.; 322 pp including index; illustrated; cloth bound. Published by the North American Manufacturing Co., 4455 East 71st St., Cleveland, Ohio. Price $2.00 plus postage.

THIS BOOK is a basic reference on the art and science of industrial heating with gaseous and liquid fuels. The opening chapter presents the elements of combustion in simple language. This is followed by a study of fuels, stressing their properties and briefly touching on their availability and operating costs.

A section is given to the important subject of combustion analysis; this includes exemplary computations and material on flue gas analysis. Another chapter deals with heat transfer losses and suggests simpli-

"Hitch" Your CLARK Fork Trucks TO THESE Star Attachments

Every CLARK fork-lift truck saves money—*—a lot* of money—for its user. Some save more than others because they are used more effectively — more efficiently — more regularly. They aren't allowed to stand idle "in between jobs." Demountable CLARK attachments enable them to do at great savings many jobs outside the popular concept of materials handling (snow plowing, coal shoveling and plant maintenance work, for example), and to do more and better jobs within that concept. Let CLARK help *you* make the most of and get the most from *your* fork-lift trucks. For your profit's sake, talk over your handling operations with the CLARK dealer nearest you—he's listed in the Yellow Pages of your telephone book.

CLARK ELECTRIC AND GAS POWERED FORK TRUCKS
AND POWERED HAND TRUCKS - INDUSTRIAL TOWING TRACTORS

INDUSTRIAL TRUCK DIVISION • CLARK EQUIPMENT COMPANY • BATTLE CREEK 98, MICHIGAN
Please send: ☐ Basic Facts Book. ☐ Condensed Catalog ☐ Material Handling News ☐ Have Representative Call.
Name
Firm Name
Street
City Zone State

How to load 54 freight cars and trucks at a time

Three-level conveyor with 54 unloading stations

• In October, 1946, 14,940 feet of Standard Rexall Belting (12" wide, 4 ply) was installed on the conveyors pictured here. Brewing Corp. of America, Cleveland, Ohio, uses this unusual three-level conveyor system to load 54 freight cars and trucks at a time.

The oustanding performance of this belting is indicated by re-orders for additional Standard Rexall Belting for use on expanded facilities at this plant.

Made from heavy, tightly woven 37½-ounce silver duck, Standard Rexall Belting is double-stitched with inner-locking stitches to permanently prevent ply separation. It is impregnated to preserve the belt and to produce a smooth, hard low-friction surface that is ideal for deflection and slider-bed service. Power requirements are 25% to 40% less than for rubber belting.

Imperial Belts are custom-made to give maximum service under specific conditions. Write for Data Sheet 48-1 and let us show you how to cut *your* conveying costs.

Imperial BELTING CO.

1759 S. Kilbourn Ave., Chicago 23, Ill.

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Chemical Manufacturer Saves $3300 a year

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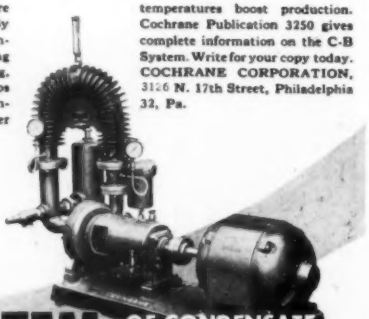

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fied methods for estimating their extent.

One of the factors that comes to mind in the design or operation of systems using liquid or gaseous fuels is the loss incurred by their flow. This is treated along with the underlying mechanics of flow.

Oil, gas and combination burners are discussed in a chapter which precedes the final two sections devoted to combustion controls and combustion systems. The latter includes a study of typical piping arrangements complemented with illustrations.

An appendix contains many helpful engineering tables. A glossary carries the many terms common to the study of combustion and thus serves as an aid in understanding the related language.

Engineering Sales

SELLING TO INDUSTRY by Bernard Lester. Size 4½ by 6⅞ in.; 255 pp; cloth bound. Published by the Industrial Press, 148 Lafayette St., New York 13, N. Y. Price $3.50.

THIS MANUAL for the betterment of sales engineers has been written by a former sales executive of a large manufacturing concern. In the book are cited actual cases of sales performance in the field. This should serve as constructive information for others doing engineering sales work.

The author presents tips that promote sales and analytical information pertaining to the unfavorable reaction of buyers to certain approaches and efforts. He tells of advance planning of a sales program for more effective selling. Different kinds of buyers' objections are covered along with ways of coping with them.

The text is divided into 13 easily read sections. Some of these are as follows: successful sales interviews; be a better equipment salesman; use all our sales tools; follow up customer's decision, grow in power and sales skill and when orders hang.

Cooling Water Industrially

COOLING TOWERS by J. Jackson. Size 6 by 10 in.; illustrated; cloth bound; 104 pp including index. Published by Butterworths Scientific Publications Ltd., copies available from Butterworth & Co. (Canada) Ltd., 1367 Danforth Ave., Toronto 6, Ontario, Canada. Price $3.50.

THIS HANDBOOK on mechanical-draught water cooling towers should be of particular interest to the non-specialist who may be placed in a position requiring knowledge of cooling tower construction and operation.

Several methods of water cooling are covered briefly, even though this book is chiefly concerned with the mechanical draught towers. An en-

tire chapter is devoted to Merkel's total-heat theory. Another chapter outlines the use of serrated wooden grid packing in towers, with a short example of design problems. Tower testing is also covered in the text.

Based on the reverse relationship of cooling hot gas and cooling water with air flow, hot gas cooling towers are dealt with in one section of the book.

The appendix carries such items as the derivation of the total-heat equation, discussion of wet-bulb temperature, comparisons of tower types, and economic factors in cooling water industrially.

Proceedings on Air Pollution

AIR POLLUTION. Size 7 by 9⅞ in.; 847 pp including index; illustrated; cloth bound. Published by McGraw-Hill Book Company, Inc., 330 West 42nd St., New York 36, N. Y. Price $12.50.

THE EXPERIENCE and knowledge of many persons in government bureaus, educational institutions and industry have been compiled in this book on air pollution.

The papers that are covered have been presented at the United States Technical Conference on Air Pollution in 1950. These are some of the contributing panels: analytical methods and properties; equipment; instrumentation and legislation. Each panel deals with a phase of air pollution that differs with the others.

Bag-type cloth dust and fume collectors, physical properties of aerosols, some effects of fluorine fumes on vegetation, statistical study of the acute effects of air pollution, a recording visibility meter, national aspects of air pollution and stack meteorology as related to power plants are a few of the papers presented by each of the seven panels.

A number of papers include a list of references which can be used by the reader for further study and investigation.

Physics

THE NEW PHYSICS by Sir C. V. Raman. Size 5½ by 8¼ in.; 144 pp; cloth bound. Published by the Philosophical Library, Inc., 15 East 40th St., New York, N. Y. Price $3.75.

THE WORLD knows Sir Chandrashekhar Venkat Raman as one of the greatest living scientists, one of the half-a-dozen front-rank physicists—a Nobel Prize Winner and an Honorary Doctor of Science of a dozen universities in the world. Few, however, know that he is one of the most humorous and fluent speakers in the English language.

This little book by Dr. Raman is a collection of radio talks which he gave to the Indian public. Hence, it is primarily of interest to the layman. In these talks he discusses those parts of nature with which all of us come in contact, but which few

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of us attempt to understand: water, soil, weather, atmospheric electricity, the structure of crystals and other topics.

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Foundry Practices Simplified

FOUNDRY WORK by Edwin W. Doe. Size 6 by 9 in., 109 pp including glossary and index; illustrated; cloth bound. Published by John Wiley & Sons, Inc., 440 Fourth Ave., New York 16, N. Y. Price $1.76.

DEALING IN FUNDAMENTALS, this book serves as a primer to foundry practices. Prepared in cooperation with the Educational Division of the American Foundrymen's Society, it is written to teach the principles of foundry work.

Beginning with a brief history of the industry, the text covers foundry tools, equipment, patterns, and their application. Several exercises in sand molding are outlined and one chapter deals extensively with the melting and pouring of metals and alloys, as applied to molding.

A-C Equipment

ALTERNATING CURRENT MACHINES by George V. Mueller. Size 6½ by 9½ in.; 502 pp; illustrated; cloth bound. Published by McGraw-Hill Book Co., Inc., 330 West St., New York 18, N. Y. $7.50.

THIS BOOK is designed for an undergraduate course in a-c machines or for use by one who is beginning the study of the subject. It presents an analysis of the construction and operating principles of transformers, polyphase induction machines, synchronous machines, single-phase motors and rectifiers.

An unusual number of problems and oscillograms are included which are used to illustrate analytically and graphically the principles being discussed. Recent applications of high frequency induction motors and rectifiers are covered.

Electronics for Engineers

PRACTICAL INDUSTRIAL ELECTRONICS by F. A. Annett. First edition; size 6 by 9 in.; illustrated; cloth bound; 381 pp with index. Published by McGraw-Hill Book Co., Inc., 330 W. 42nd St., New York 18, N. Y. Price $5.50.

THE COVERAGE given to industrial electronics by this book is in the nature of an introduction of the subject to operating engineers and electricians. Aimed at these men, who generally have little training in the subject, the book describes the various components of industrial electronic controls, such as electron tubes, photoelectric tubes, rectifiers and relays.

Chapters on photoelectric devices, smoke indicators, combustion indicators and controls describe these electronic engineering aids in rather plain terms. Operating details of motor controls, for both alternating and direct-current motors, are included as individual chapters.

Drawing Fundamentals

APPLIED DRAWING AND SKETCHING by Joseph W. Fleming, Dewey F. Barich, and L. C. Smith. Size 8½ by 11 in.; 156 pp; paper bound. Published by American Technical Society, Drexel Avenue at 58th St., Chicago 37, Ill. Price $2.00.

THE OUTSTANDING feature of this book is its down to earth application to the needs of everyday life. The book supplies the basic knowledge necessary for proper interpretation of drawings and also provides training to speed up progress in subsequent courses in drafting. It does not require the use of any drafting instruments.

The text first takes up the use of drawings, then the reading of draw-

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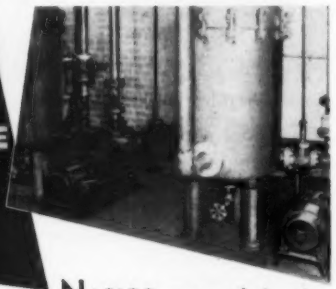

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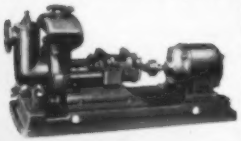

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ings, next the making of pictorial drawings. There is a good chapter on basic lettering forms, and then the authors take up the making of working drawings, graphs and maps.

One section shows how to read machine shop and building trade blueprints. The final chapter covers planning and shows how designs should be worked out before actual construction is attempted.

High Frequency Heating

INDUSTRIAL HIGH FREQUENCY ELECTRIC POWER by E. May. Size 5½ by 8¾ in.; 355 pp; illustrated; cloth bound. Published by John Wiley & Sons, Inc., 440 Fourth Avenue, New York, N. Y. Price $5.00.

FOR THE READER who is interested in applying high-frequency heating to industrial problems, this book will serve as an excellent introduction. From basic circuit theory to operating problems it provides a concise summation of basic facts in this growing field. It is well suited to give inexperienced people in the industry a source of basic facts and instruction on how these facts can be used as a guide to specific heating performance.

Among other things, Dr. May gives an excellent summation of the a-c theory involved in tuned and coupled circuits, a brief discussion of arc and spark oscillators, a description of high-frequency alternators, discussion of the triode tube and Class B and C amplifiers, induction and dielectric heating.

Replacement of Equipment

COMPANY PROCEDURAL MANUAL on Equipment Analysis by William Kelly & Company. Size 8½ by 11 in.; 46 pp; illustrated; cloth bound. Published by William Kelly & Company, 120 S. LaSalle St., Chicago 3, Ill. Price $5.00.

WHAT IS it costing you to operate economically dead equipment? The author of this book has been trying for some time to arouse industry to the importance of studying this question very carefully and has here worked out a scientific approach to re-equipment analysis for the buyer, for the seller, for professional engineers and for use as a college text.

The first three chapters are addressed to the policy making executive, discussing what is wrong with present replacement practice. These include an introduction to the MAPI formula and procedure, and the proper organization of equipment policy.

The three final chapters discuss interesting applications of the formula as well as a simplified chart solution. The Manual is intended to show equipment users how to test and perfect their replacement practices by asking and answering a number of specific questions.

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Ventilating and Heating

(Continued from page 92)

ardization with other fans, ease of maintenance.

Before tackling a particular exhaust design problem, it is important that a brief lesson in "fan economies" be learned. To be concise, the fan that takes out the undesirable elements also takes out heat in winter. One authority has stated that each 1000 cfm of air exhausted costs the equivalent of one ton of coal per season. Think of this; a little simple arithmetic will prove the statement is not too far out of line. Then count up the fans, by sizes, and add the score. Multiply by the price of a ton of coal, and you have the sad news! This one brief lesson in economics should be remembered — unless you want to heat the great out-of-doors, and pay for it.

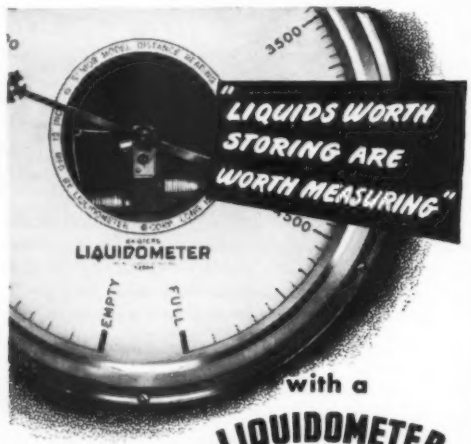
Perhaps the installation of one small fan doesn't create a problem; even two or three might not. But, if you continue to add exhaust fans indiscriminately, without providing the make-up air to offset that taken out, the time will come when you have serious trouble on your hands. It's true that a lot of air comes in through doors, windows and cracks; however, this air brings in dirt with it. Of course, this costs money, too. Your cleaning costs go up, and housekeeping suffers generally. Quality control supervisors can often place the blame for high reject rates on something as elemental as a man-made "dirt-trap" — created by exhaust fans. The prevention of such a condition is, of course, an obvious one: supply as much clean, heated, make-up air as is exhausted. This is not a cheap remedy; however, the cure in any case is not cheaply provided. Air-replacement units consist of filters, heat coils and fans; these require heat, electricity and maintenance labor. But, the proper installation of the units is a must, eventually.

In the removal of certain airborne solids, it is possible, and economical, to collect these dusts in a wet-type collector. With this equipment, the air is cleaned and is then returned into the plant. State and municipal authorities usually prescribe where, and on what materials, these collectors can be used. Certain occupational diseases are traceable to dusts caused by industrial processes; that's the reason for the regulatory restrictions by government authorities.

Then too, there's the problem of what to do with the dusts or noxious fumes exhausted from a plant. If the dusts have any value (and most of them do), you'll want to recover them — as a matter of economics. Even if they aren't of much value, they can't just be blown outside for your neighbors to enjoy. There are numerous types of "cyclones," bag-filters, and other dust-recovery systems on the market that can lick this problem. Complete recovery of exhausted dusts is most nearly attained through use of electrostatic precipitators, or new types of filters designed for recovery of submicronic particles. The cost of either scheme is expensive, but warranted, in some cases.

Spray booths constitute one of the major sources of process air removal from plants. A general rule-of-thumb formula calls for 1000 cfm of exhaust for each linear foot of length of booth. Then, applying this rule, plus the one mentioned earlier (concerning heat loss), one finds that a 10 ft spray booth exhausts enough heated air to require 10 ton of coal per season. Pretty expensive, isn't it? Much research is being done in this field, but we are still a long way from the final answer.

One or two manufacturers have come close to the answer. A centrifugal paint applicator device eliminates the need for air-pressure spray guns, hence the elimination, also, of large exhaust fans. This device was developed originally for



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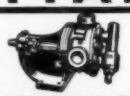

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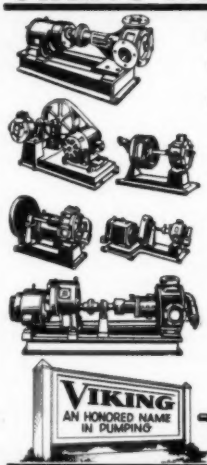

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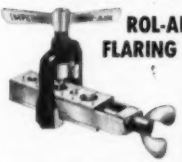

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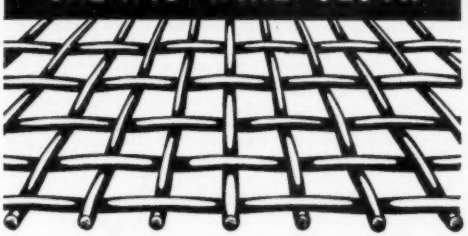

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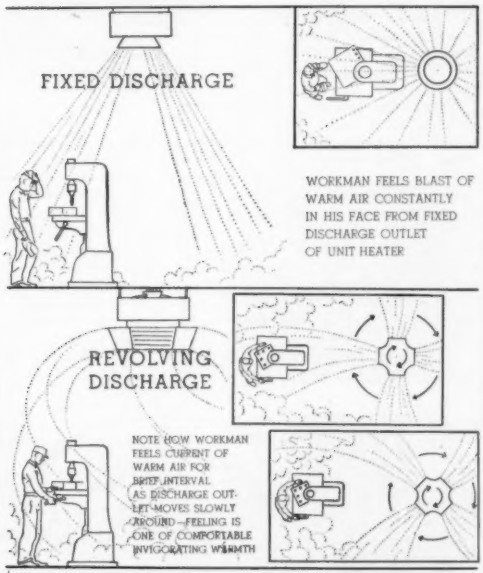
FIXED DISCHARGE
WORKMAN FEELS BLAST OF WARM AIR CONSTANTLY IN HIS FACE FROM FIXED DISCHARGE OUTLET OF UNIT HEATER
REVOLVING DISCHARGE
NOTE HOW WORKMAN FEELS CURRENT OF WARM AIR FOR BRIEF INTERVAL AS DISCHARGE OUTLET MOVES SLOWLY AROUND—FEELING IS ONE OF COMFORTABLE INVIGORATING WARMTH

WING REVOLVING UNIT HEATERS are successfully solving the heating problems of thousands of industrial plants today because they assure a uniform comfortable temperature throughout, with no hot blasts, no cold spots, no chilly corners. Instead of annoying hot blasts, the worker is conscious only of a pleasing sensation of fresh, live, invigorating warmth.

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mass painting of small parts, but was a revolutionary innovation in the art of production painting. Another good idea popped up a short time ago, in the form of a spray gun which throws out the paint by centrifugal force—rather than by the use of air pressure. Such devices require some small amount of exhaust to remove the inflammable solvents, but the amount of air moved is negligible compared to that of a spray booth. Surplus paint is reclaimed from water-wash types of spray booths; and electrostatic precipitators will remove all surplus paint immediately after spraying operations. Regardless of the type of process equipment in use, all feasible means should be used to reclaim as much clean, safe air as possible — and return it into the plant.

Most state industrial codes require ventilation in toilet rooms, and prescribe the formula for calculating sizes. Even though some locations might not require them, common sense dictates their use. Toilet rooms in plant interiors absolutely must have fans; in those rooms located around outside walls, fans are prescribed for winter use — to save opening windows.

In designing ventilating equipment, always consider these basic points:

1. General movement of air, even though it is warm, contributes to employee comfort—due to evaporative cooling.

2. Keep exhausted air to a minimum.

3. Provide the same amount of cleaned, heated air as is removed by exhausting.

4. Control—and recover—all possible dusts having any value. Control and remove those of no value.

5. Make use of waste heat, if at all economical to do so.

6. Carefully analyze each piece of equipment requiring an exhaust. See that its exhaust is properly designed and most efficient.

Air Compressors

(Continued from page 89)

Where metallic packing is employed, follow the special instructions of the compressor or packing manufacturer.

When the stuffing box in the cylinder end of the crank case contains metal oil wiper rings, these rings must be installed properly in accordance with the compressor manufacturer's instructions for the particular type used, because the rings have special edges for wiping excess oil off the piston rod and permitting it to drain back into the crank case. These rings should be cleaned periodically, and broken clamping springs should be replaced immediately.

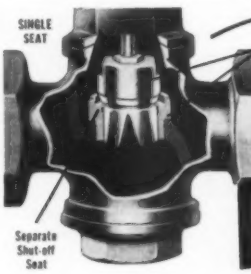
In addition to regular periodic maintenance, a sufficient stock of renewal parts will help provide insurance against long and unexpected shutdowns, with consequent loss of production. The renewal parts stock should include such parts subject to wear as valves, gaskets, packing, springs, etc.

Electrification Council

FORMATION OF the Industrial Electrification Council was recently announced by J. Reed Hartman, Chairman of its Executive Committee, and Merrill E. Skinner, Chairman of the Commercial Division General Committee of the Edison Electric Institute.

The purpose of the Council is to foster and coordinate the dissemination to American industry of factual information on the application of electricity and electrical apparatus to industrial processes and other manufacturing operations for the purpose of developing a wider knowledge by American industry as a whole of the opportunities to increase production, improve quality and reduce costs through the widest economic use of electricity.

Because of the breadth and complexity of the field of industrial electrification, the Council is restricting its initial operations to industrial electric heating, although it expects to expand into the other branches of the field as it develops its organization and techniques.



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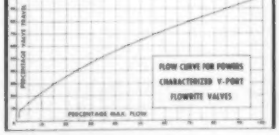

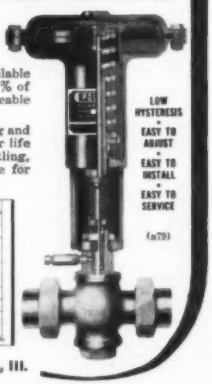

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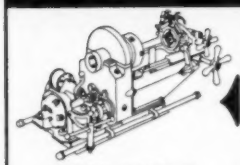

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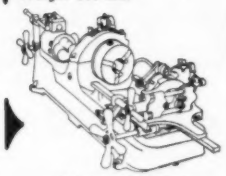
A rugged, Heavy-Duty Machine. Range ⅛ to 2". Up to 12" with Geared Tools and Drive Shaft. Bolts ¼ to 2"—Weight 365 lbs.



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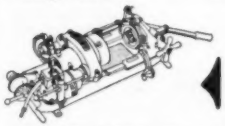

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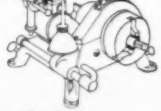

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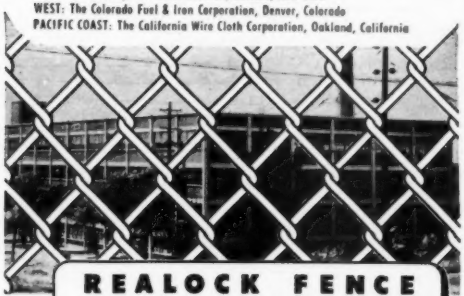

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How Pittsburgh Brushes SPEED PRODUCTION

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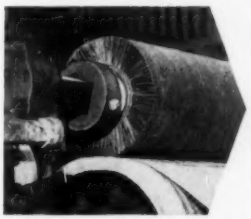

Crown Cork & Seal Co., Inc., asked Pittsburgh engineers to recommend a brush suitable for washing oil film from steel before annealing. A "built-up" brush made of Tampico sections was installed. Oil and foreign matter were completely removed without harming the surface of the steel. Production showed an immediate increase, and time saved due to fewer brush replacements added to the overall savings.

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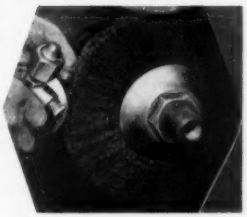
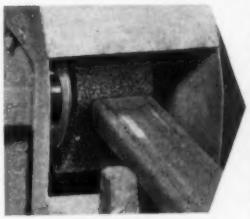
Frequent breakdowns and brush changes hampered Bastian-Blessing Company's production of satin-finish parts for its products. Pittsburgh engineers recommended a crimped steel, standard 10" brush. Reports after three years' use show Pittsburgh Brushes have increased production, improved quality and saved materials . . . while lasting *three times longer* than previous brushes!



3. Removing burrs from steel!



Problem: The National Electric Company needed a brush to eliminate burrs and scale, yet the brush had to combine cleaning ability with long life. Solution: Pittsburgh designed a brush to specifications—a brush that was stiff and tough enough to penetrate, clean, and remove burrs and scale, and rugged enough to stand up. Result: An increase in efficiency; a jump in production!

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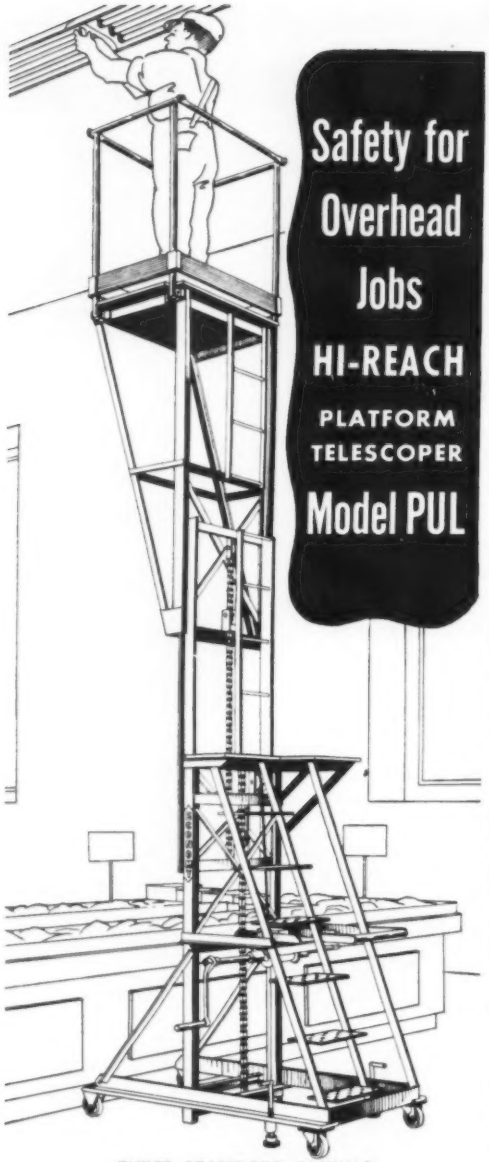

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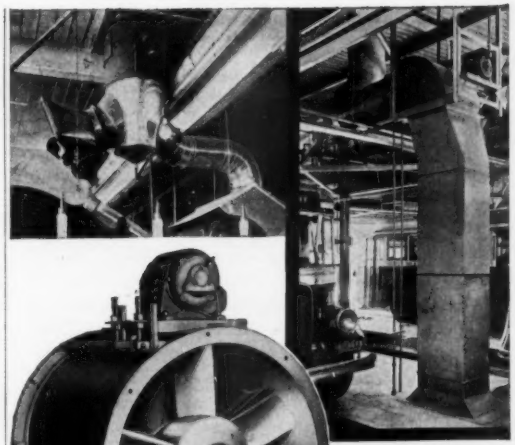
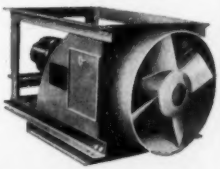


Upper left: Wingfoil Straight-Line Duct Fan in Textile Mill. Upper right: Wingfoil Elbow Type Duct Fan exhausting gases in a Garage.

Wingfoil Straight-Line Duct Fan

Wingfoil Elbow Type Duct Fan



WINGFOIL DUCT FANS DELIVER LARGE AIR VOLUMES with Low Power Consumption . . .

The Wingfoil Axial Flow Duct Fan, in either elbow type or straight line type, is a compact, economical fan designed to operate against static pressure. Both types have the motor outside the casing, unaffected by hot or dirty gases. Light weight, compact, easily handled, they may be inserted into a line of duct, either as an elbow or a straight section.

Write for Bulletin F-10

L. J. Wing Mfg. Co. 177 Vreeland Mills Rd.
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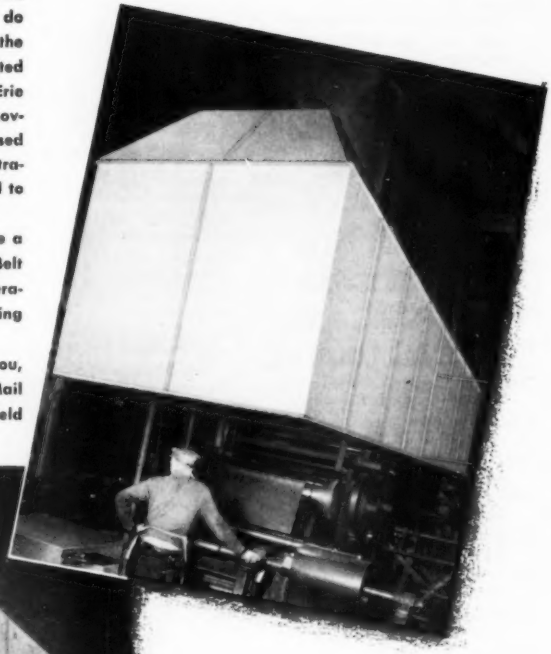
in Erie, Pa. HARTZELL FANS

SOLVED A PRODUCTION PROBLEM

Hartzell can solve your industrial air moving problems just as they did for this Erie, Pa. manufacturer. And do it efficiently and economically with the assurance that the installation specified is *exactly* right for the job expected of it. Perhaps *your* problem is similar to that of this Erie roofing products manufacturer. He was faced with removing noxious fumes from above and around machines used for applying coating to roofing materials (see illustrations). Under certain weather conditions, the plant had to be closed for days. Time and money were lost.

The Hartzell field engineer was called in. He made a careful survey—then specified Hartzell ND36-F-BDS Belt Drive Duct Fans, specially constructed for high temperature service. These fans did the trick. And they are saving this manufacturer money every day of operation.

Hartzell fans and blowers can do the same for you, even in the trickiest of installations. Find out more. Mail the coupon or get in touch with your nearby Hartzell field representative today.



Above and to the Left: Two views of the saturators which apply coating to roofing materials. Two Hartzell belt drive duct fans are in use in each illustration.

The Hartzell field office which handled this job is located at 33 Maple Ave., North Girard, Pa.—Telephone 317.

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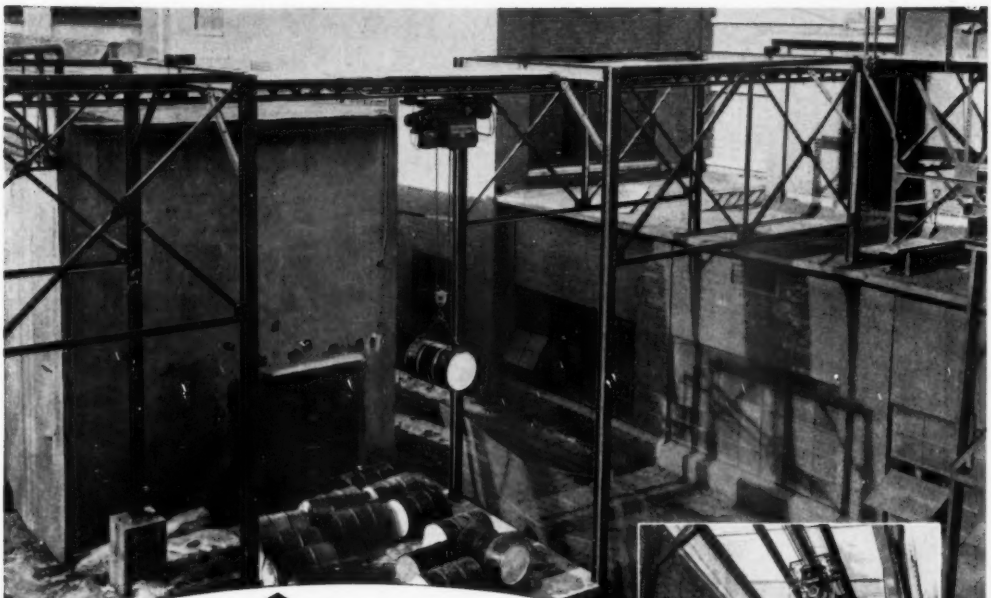

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